# POPULAR Only 40p. COULT ONLY 40 P. Only 40p. 18-24 October 1984

It's the best selling weekly

Vol 3 No 42

# Spectrum+ surprise

SINCLAIR, in a surprise announcement, has launched a new machine — the Spectrum+.

The machine will be in the shops this month and will cost £179.95.

What you get for your money is a 48K Spectrum in a new case with a QL-type 'professional' keyboard. The machine is fully software compatible with the existing 48K Spectrum and included in the £179.95 price is an 80-page full colour manual and six free software programs: Scrabble, Chequered Flag, Tasword 2, Chess, Vu-3D and Make-a-Chip.

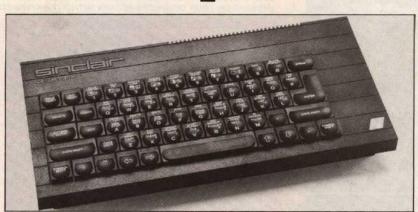
The Spectrum+ is also fully compatible with ZX Interface 1 and 2 and microdrives.

Sinclair will continue to sell the 48K Spectrum, priced at £129.95, and the ZX Expansion System — with which the Spectrum+ is compatible — will continue to sell at £99.95.

"We have been listening to all the people who have been saying that the Spectrum needs a good keyboard," explained a Sinclair spokesman.

He denied that the Spectrum was a reaction to falling Spectrum sales: "The classic wrong thing to do is to wait for your leading product to mature before doing anything about it. The Spectrum is still the number-one selling machine and I think that our share of the market come Christmas will be

continued on page 5



# Micronet settles on fight with Compunet

A BATTLE of the databases now seems inevitable as Micronet plans a November launch for its own Commodore 64 viewdata and telesoftware service — a direct rival to Commodore's own, recently launched, Compunet system.

Micronet's C64 modem package, using the Prism modem 1000 unit, will cost 4p less than the Compunet system — £99.95 compared with £99.99.

Commodore 64 owners who opt for the Compunet modem hoping also to access Micronet — as advertised by Commodore — now seem likely to be disappointed. By paying an

additional £5 Compunet users will be able to buy British Telecom's viewdata software package giving access to Micronet and Prestel, but Compunet modem owners will not be able to use any of Micronet's interactive services — they will not be able to down-load software from the system or upload information.

This is because the Scicon Rom software necessary to access the interactive services on Micronet is available only to Micronet subscribers. "This software is unique to us," confirmed Micronet's John Prout.

#### Ocean buys Imagine left-overs

IMAGINE'S name and remaining assets have been bought by the Manchester software house, Ocean.

Ocean last week announced it has competed negotiations for the purchase from Imagine's liquidator, Christopher Chambers of Arthur Young McClelland Moores, of the major portion of the failed company's assets, including its name,

continued on page 5



Ocean's managing director, David Ward

## INSIDE EINSTEIN REVIEW ) NEW MUSIC COLUMN ) QL M/C

# **™KoalaPad**.TouchTablet

# JUST PICTURE









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# **View**

here is nothing wrong with a bit of healthy competition between micro-companies — it keeps them on their toes and encourages them to offer better products and services.

Occasionally though such competion can act against the consumer's interests.

Now we have Micronet, the BT-Prestel-Telemap venture, and Commodore's Compunet both competing in the - so far comparatively small networking market for Commodore 64 owners. They are both producing their own modems and, while each can be used to view the other's system, only the Micronet modem can be used to access any of the Micronet's system's interactive services - down-load software, send messages or access its teleshopping service. And it seems likely that the converse will also be true - that Micronet modem owners will not be able to down-load Compunet software or access Comp-u-Card.

What this means is that any Commodore 64 owner wanting to use both services to the full will have to spend £200 rather than £100 and buy two modems rather than one.

Which all seems extremely short-sighted. At such an early stage in the development of interactive consumer services surely now is the time for co-operation. As it is, people may be uncertain which service to choose and end up joining neither.

BT — which approves such systems — should perhaps step in and indicate some sort of communications standard.

And is it also a good idea that BT should have a commercial involvement with one particular system?

# POPULAR, Vol 3 No 42 WEEKLY

Presents...

News > Two more for MSX > QL Discs > Oric writ

Machine Review > Jeff Naylor tries out Tatung's Einstein micro

Star Game > It needs a steady hand to play Mad Maze by Chris Lea on the CBM 64

Hardware Review > Graham Taylor has been making funny noises....find out about them and the LVL Echo 1 keyboard for the BBC B

Software Reviews > New for the Amstrad from Kuma flies Star Avenger > Traffic in the front room courtesy of Quicksilva

Spectrum > Map your microdrives with this utility from Philip Hickling

The QL Page > Hold your breath...Part One of a QL Disassembler by Keith Poole

**Dragon** > No smoke without fire ... Birthday Cake by Nicholas Smith

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# by Chris 16

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ILKSHVA

# Futures...

Astronomy program for the Electron ... a new print routine on the Spectrum ... part 2 of the QL Disassembler

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Computer Trade Association Magazine of the Year

18-24 OCTOBER 1984

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# Oric served writ by Durrell

NOTWITHSTANDING last week's vote of confidence in the financial viability of the company from its major suppliers, Oric has now been served with a writ by Durrell Software for non-payment of a £4,000 debt resulting from tapes supplied by the software house to Oric. Commented Oric spokesman, "Durrell will be paid as soon as possible.

"Oric's recent cash-flow problems have been widely reported and as a result of the meeting of major suppliers Oric now has the time it needs to sort itself out.

"The company has £6m worth of outstanding orders and its cash flow problem is already showing signs of easing."

#### Ocean

continued from page 1

logo and trading style.

Ocean intends the Imagine name to be used for a range of new prestige titles. Commented Ocean's managing director David Ward, "We intend to sell a limited number — half a dozen a year — of state-of-theart games under the Imagine label."

Among the first titles to be released by Ocean will be a completed Imagine-written game also acquired from the liquidator — Baseball, for the Commodore 64.

As well as taking over the Imagine name, Ocean has also employed a team of eight eximagine programmers to work on the development of a number of new titles for the Ocean label including an animated strategy adventure, due for release at the end of November.

The eight-srong team is the same one — led by John Gibson — which developed the Bandersnatch megagame for Imagine, recently sold to Sinclair (see Popular Computing Weekly, October 11).

"They will work for Ocean as a separate programming cell in Liverpool on a twelve-month contract", explained David Ward.

#### Two more MSX micros

THE MARCH of MSX continues with two more Japanese companies announcing MSX-compatible machines.

Yashica — best known in the UK for its camera equipment has launched its YC-64 64k Yeno DPH-64. Although Sega is best known in this country for arcade games like Frogger and Zaxxon it sold 120,000 home micros in Japan last year and its previous machines—the Yeno SC3000 16K and 32K



micro. No price details are yet available but first machines are expected to arrive in Europe at the beginning of next month.

Sega, the top arcade game manufacturer has also announced an MSX home micro — the models (all Z80A-based) have been marketed in other European countries — though not the UK. No details of price or delivery dates for the DPH64 MSX machine are so far available.

#### Disc drives for the QL from Quest

QUEST Microsystems is shortly to announce a range of disc drive units for the QL, starting with a single Sony 3½ inch microfloppy device and including a Winchester hard disc.

The company is also announcing additional memory, and business software to accompany its previously announced CP/M 68000 version of CP/M. The CP/M 68000 system does not require a Z80 processor — commercial Basic programs are simply recompiled.

Whilst prices for the disc options are not yet known a Quest spokesman said they would be "in line with the price

#### Spectrum+

continued from page 1

very positive.

"This time it is not perhaps a very innovative product — but it is a very clever piece of marketing and repackaging.

"With the six bundled software packs the Spectrum+ represents extremely good value." of the QL, ie cheap." The single disc drive add-on is expected to retail for close to £100.

Psion are known to be working closely with the company on software support for the new QL peripherals.

# C64 music keyboard

COMMODORE has launched a music keyboard add-on for the C84 which simply clips over the existing computer frame and, by a mechanical action, presses down on the keys below to produce a note.

The music keyboard comes with software to use the Commodore as a simple synthesiser with up to three-

### 7th record year for Commodore

COMMODORE, in announcing its financial results for the year to June 30, 1984, has shown a further period of solid growth.

Sales are up by 86 per cent compared with the previous year to \$1.27bn and profits have increased by 63 per cent over the same period, up to \$143.8m.

It is the seventh successive year of record sales and net earnings for the company.

Commodore share prices however fell in the last quarter of the period to June 30 resulting from investor uncertainty following the departure of the company's founder Jack Tramiel in January and his subsequent reappearance as Chief Executive of Atari.

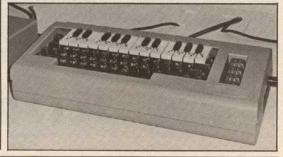
#### BT games

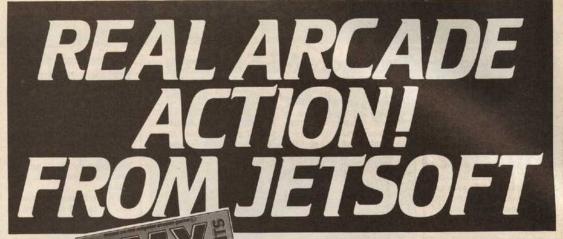
BRITISH Telecom's game software venture, Firebird, will follow its first three budget-priced £2.50 titles launched next month — The Wild Bunch (Spectrum 48K), Booty (Commodore 64) and Bird Strike (BBC) — with another 16 titles.

These are: Run Baby Run and Menace (Spectrum 16K); Mr Freeze, Exodus, Booty, Terra Force and Viking Raiders (Spectrum 48K); Head Ache, Mr Freeze, Exodus, and Zulu (Commodore 64); Mickey the Bricky, and Snake Bite (Vic20); and Gold Digger, Acid Drops, and Duck!

note chords, eight pre-set sounds and simple rhythms.

The package — on sale next month — which also includes a songbook containing some simple tunes, has been produced for Commodore by Music Sales and will retail for £29.95.







BMX STUNTS Based on the original arcade game this action packed game challenges your skill over six tests, straight race, wheele, ramp jump, stalom, bunny hops and the ulitmate test over a V.W. beetle in the Beetle ride.

COMPLETE COMPLETE CONTINUED CONTINUE

2 minutes

FAST LOAD

Can you destroy the wicked wizard of of castle Cavelon? Can you avoid his mystical powers? Only after negotiating the six levels in his castle. Collect all the door pieces before you can attain the next level, pick up sh

QUAIL

27 levels of increasingly difficult real arcade action. Based on the game Bongo, you must avoid the chasing dinosaur, pterodactyls, falling rocks, native spears and bouncing Bongos. Negotiate rope bridges and erupting volcanoes, picking up the treasures of a lost civilisation as you go – and finally cage the dinosaur if you can!

#### SPRITE AND CHARACTER EDITOR

The Jetsoff Sprife and character editor is a professional quality character editor written entirely in machine code. If can be used to write new or modify existing character sets it is quick and easy to use having a number of sophisticated commands not available on most other eaties, along with coholies obscreen instructions.



<u>the</u> arcade people 061 775 0333



#### Letters

#### 'Rotten' Spectrums

I have just read your article in the August 30 issue about cassettes being pirated by the Portuguese company Microbaite.

Last year I bought a Spectrum from Timex in Portugal (which came complete with a Horizons cassette translated into Portuguese by Alfa Micro). Timex has, according to a recent newspaper report over here, sold 30,000 Spectrums in Portugal.

Since my purchase the computer has had to go back to be repaired by Timex more than seven times within the six-month guarantee. As a result I have only had the computer for seventeen days. Then the guarantee ran out and the machine malfunctioned again and I didn't know what to do.

I decided to visit a lawyer to try and find a way of getting the money I spent on repairs back.

He took a look at my Spectrum and advised me that there was nothing he could do.

This was because my machine had no serial number, and no marking on the case indicating country of origin or manufacturer.

We came to the conclusion that my machine was a 'pirate' Spectrum copy.

At the time I decided to keep quiet and give up trying to get my money back but, after reading your article I screw up my courage. And here I am.

I hope you will understand why I do not want to identify myself.

A disappointed Spectrum owner Lisbon Portugal

#### Disgust — 1

Either David Riley (letters, October 4 issue) is deliberately trying to harm Automata's reputation of providing positive entertainment, or he doesn't know his lower-dorsalsphincter from his outer-midarm-joint.

How dare he twist the creative optimisim of Deus ex Machina by finding the struggle of a non-conformist against repression "indecent". We work hard to entertain Popular Computing Weekly readers with our back cover comic strip every week, and I take a very dim view of this sort of "yours disgustedly" hypocrisy.

What about the adverts in the same issue which invite you to kill in order to "win", to buy replica firearms, and to commit genocide. If I didn't laugh I would despair.

Mel Croucher Automata

#### Wilf-ful thinking

Ode To John Minson That Kokotoni Wilf is po-

pular

Is plain for all to see. It's rising fast through all the

Which causes us much glee. Your reviewer young John Minson

Who gave Wilf quite some

Says "This is such a super game.

I'll give it four times one

telly." Now the only adverse

comment passed Which made my hair start

thinning. Was "When your sixth Wilf is

You must go back to the beginning."

For this is not the truth you know

Your choice of start is free. To begin in a different place Just press keys two or three. Thanks for a rave review of Kokotoni Wilf all the same.

> Steve Wilcox Elite Systems



"Did you have to go and buy Imagine's Trading Style as well?

#### Tacky tribe

would be extremely grateful if you would print my letter as I was one of the first to complete a fantastic new game Kokotoni Wilf by Elite.

This morning I received a letter saying that if I could get my letter printed in any magazine I would have the chance of meeting Lee Majors, star of Elite's next game, The Fall Guy. So here is my letter:

"I would like to say to your readers just how brilliant the game Kokotoni Wilf is. After buying it I have been hooked ever since. The game, structure and graphics are all truly amazing."

> Matt Woodley 32 Hatharop Road Hampton Middx

Identical communications were also received from: Sean Townsend, Simon Davies, G R Hawkins and Darren Hallett, all of whom, it would appear, are easily bribed.

Bit tacky, Steve.

#### Disgust — 2

thought your readers (and Automata) would like to know that I was responsible for the sketch of Alice Cooper on the dustbin in the first frame of the Pimania back-page cartoon advert in the October 4 issue.

It proves that Automata is the most human company around. I had just woken up after a four-day party (lots of drink, heavy music etc) at 3 o'clock in the morning.

I had no-one to talk to so I rang up Automata's answering machine and had a ten minute conversation about Alice Cooper. The next week included in their cartoon was a picture of him - which really made my day.

So, thanks Automata and don't believe rubbish like the letter in the same issue from 'disgusted of Birmingham'.

PS Readers: go and buy some Alice Cooper music - it's still published!

#### **Below par** champion

T thought you might be interested in the ad from Sinclair for the QL now appearing in the colour magazines.

The advert shows a truly impressive display of the Psion QL chess program which recently won the 1984 Microcomputer Chess Championships (see September 27 issue).

The interesting point is that, in the picture, the board is set up incorrectly - the black king and gueen are on the wrong squares - the queen should be on a square of its own colour.



Perhaps the bugs are still alive and well in the OL? Or perhaps the standard of the opposition in the championship was a bit below par!

Philip Reynolds 6 St George's Street St Annes on Sea Lancashire

#### Vic reassurance

fter reading your magazine again this week I find that there are no software listings specifically for the Vic20.

This is very annoying as there are 11/2 pages on the QL and a page on the Amstrad.

I don't want to knock these machines but there must be more Vic owners than QL and Amstrad owners put together.

Us Vic owners seem to be left out in the cold by all the flashy new micros of today.

J J Longworth 6 Melita Street Darwen Lancs

Not at all. While we obviously have to cover the new machines, there is no question of letting the Vic fade away. There is a Vic20 program in Open Forum this week and there will be a Vic20 Star Game in the November 1 issue.



#### CHARTACTION 3D ANT ATTACK

#### QUICKSILVA TOP 20 - SEPT 1984. MACHINE PRICE NAME

1	*Summer Games	- CBM 64 Cass -	£14.9
		Disk-	£19.9
2	*Ant Attack	- CBM 64 Cass -	£8.9
3	*Zombie-Zombie	- 48K Spectrum -	£5.9
4	*See-Saw	- C8M 64 Cass -	£7.9
5	Trashman	- C8M 64 Cass -	57.9
6	*Strontium Dog	- CBM 64 Cass -	17.9
7	*Battlezone	- 48K Spectrum -	£6.9
8	Gatecrasher	- Electron -	16.9
9	*Magic Micro Mission	CBM 64 Cass	£7.9
	Boogaboo	- CBM 64 Cass -	£7.9
	Bugaboo	-48K Spectrum -	£6.9
12	Fred	- CBM 64 Cass -	£7.9
13	Gatecrasher	- BBC Cass -	£6.9
14	Fred	- 48K Spectrum -	£6.9
15	Drum Kit	-BBC Cass -	£9.9
16	Ant Attack	- 48K Spectrum -	£6.9
	The Snowman	- 48K Spectrum -	£6.5
18	Traffic	- CBM 64 Cass -	\$7.9
19	Electro Art	- Electron -	£145
	Doodle	- CBM 64 Disk -	£145
	The state of the s		

#### SEE SAW

\*New Release

Amazing fantasy Arcade game. Commodore 64 Turbo Cassette £7.95

Raymond Brigg's THE SNOWMAN Commodore 64 Turbo Cassette £7.95

They came from out of the desert to the lost city of Antescher and discovered the HORROR of the ANTS... 3D Action - Commodore 64 Turbo Cassette £8.95

#### **ERIC BRISTOW'S PRO DARTS**

48K Spectrum £6.95

#### **EPYX SUMMER GAMES**

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Interactive films featuring 'Norman the Warrior'. CASTLE OF JASOOM £12.95 DUNGEONS OF BA £12.95

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ATARI' 48K Spectrum

£6.95



All titles available from Quicksilva Mail Order,

P.O. Box 6, Wimborne, Dorset BA21 7PY.

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BLOOD & GUTS▲

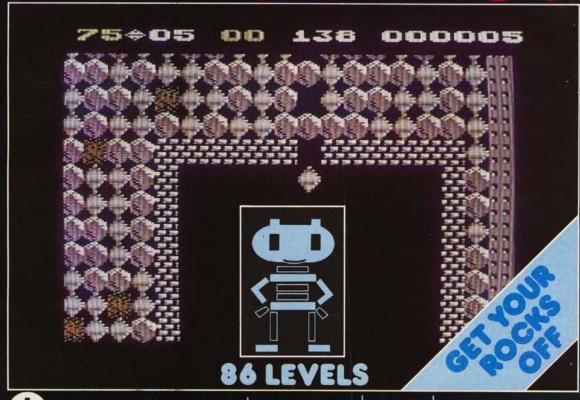
A fantastic fight to the death within vour own bloodstream! 48K Spectrum £6.95

#### STRONTIUM DOG ▶

The Killing 48K Spectrum £6.95 The Death Gauntlet Commodore 64 Turbo Cassette £7.95



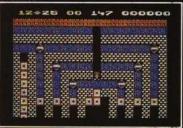
# BIGGER, BOULDER, BEAUTIFUL AMERICAN NOI.





# BOULDEN DASN

commodore







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**DISK 10.95** 



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Really Something Else

# Most software companies assume you look like this.

There are plenty of software packages around to help control businesses. Most of them do some of the things you require very well indeed.

The trouble is, they can be rather a handful. You need one disc for word processing, another for spreadsheet.

One for database, another for graphics and so on. Each with its own set of commands.

Lotus Symphony does everything any office is likely to need on one disc.

It puts you in touch with others. No man is an island and Symphony's communications let you receive and send data back and forth between your mainframe and other computers.

It does your word processing.

After all, once you have all your data together, you don't want to start again with another disc to put it into a letter.

It gives you an enormous database with access to, up to 8000 records.

And its spreadsheet is the largest and most advanced there is with 8192 rows by 256 columns.

Colour graphics are a buzz word these days, so Symphony gives you seven. All of which are available at a single keystroke.

Symphony also caters for people who like to see everything at once.

So you can have spreadsheet, database, graphics and word processing all on screen at the same time. Each in its own window.

Then you can zoom in and out and shuffle them around like papers on a desk. Also with add-in applications, Symphony can grow with you, so there are no limits to what it can do.

Yet although it does the work of many, Symphony is easier to operate than some dedicated programmes.

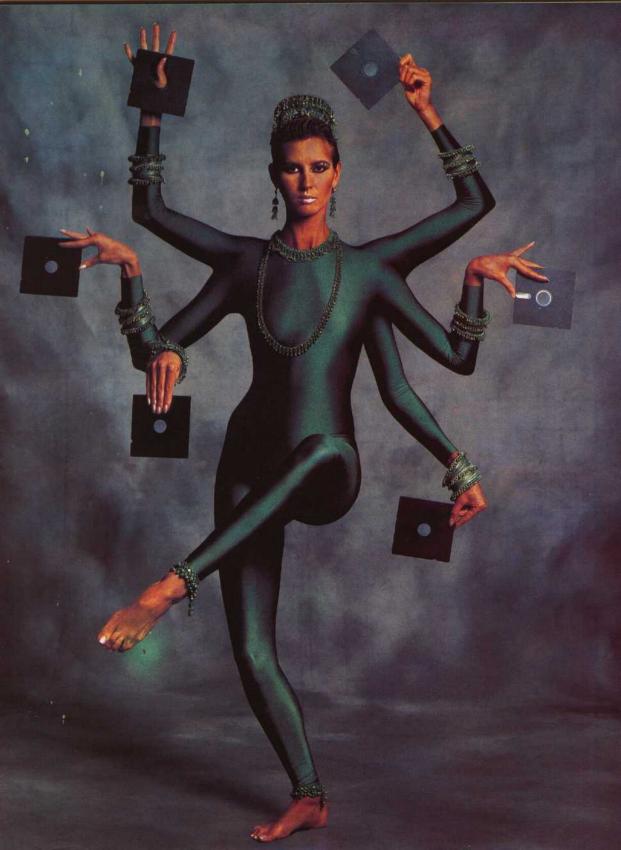
But if your needs are simpler there's still Lotus 1-2-3."

It covers the needs of most offices (spreadsheet, graphics and database) on, of course, one disc.

Because one thing Lotus always assumes is that you only have one pair of hands.

For further information on Symphony and Lotus 1-2-3 (still the biggest selling software package in the world) call Teledata on 01-200 0200.

Lotus 1-2-3 and Symphony



### Machine review

#### **Up-market**

Machine Einstein Price £499.99 Supplier Tatung UK Ltd Computer Division, Bridgenorth, Shropshire WV15 6BO

atung are a Taiwanese company that took over the Decca factory in Shropshire; they still produce goods under the Decca banner, but are using the Tatung title for their more up-market products. The Einstein is aimed at the top end of the home market, as well as having educational and business aspirations. A Ram based machine, with 64K for languages and programs and 16K for the video display, it has an 8k Rom to hold the machine's own operating system. With Basic loaded there are 43324 bytes free. The computer also boasts a 3" disc drive, all for £499.99.

You get a big computer for the money: a 14" colour TV sits comfortably on the flat area behind the keyboard. Removing the top reveals a well laid-out interior: the shielded power supply occupies one corner, but the main circuit board fills the rest of the space - it is about 12" square. There are no custom chips in evidence: the Z80A CPU runs at 4 Mhz and is accompanied by two Z80 support devices, a P10 and CTC. Studying the rest of the board is like playing spot-the-chip; RS 232 drivers from the QL: the PAL encoder in the Spectrum: the same sound generator as the MSX machines. Connectors are of a high standard: the only board edge used is on the Teac manufactured disc drive.



switch between monitor, DOS and Basic. The sound facilities of the Einstein are about average. The AY3-8910 provides one noise and three tone channels; from Basic you can get at the registers directly with the PSG command, or allow software to do the work for you by using Music, Voice and Tempo. The quality of the effects possible are enhanced by a 0.5 watt speaker which lives behind the grille above the keyboard; a volume control is provided.

Screen graphics are very similar to those of the Memotech, Sord and MSX range of machines, as the video controller is a Texas Instruments chip with 16 colours (including transparent), 32 or 40 column text display

and 32 planes of sprites. The pixel resolution is 256 by 192 but the colour attributes file is not so generous: if you try to draw a line of one colour over a block of another, the fact that the horizontal colour resolution is restricted to 32 blocks of eight pixels will become apparent. Wellwritten programs should be able to avoid this problem (the colour resolution is still better than the

Spectrum, for example) and the problem does not affect he sprites. A UHF TV output is the cheapest way of getting a picture out of the Einstein, but a monitor socket also gives either RGB or YUV signals colour signals. Tatung hope to sell their matching colour monitor (£240), so the monitor output is set to give YUV (luminance and two colour difference signals): adjusting for RGB is simple, however.

An 80 column card is available. It was not provided with the review machine, but was

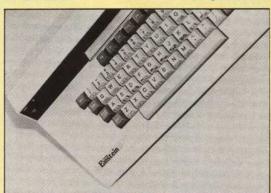
on display at the PCW show. Not so much a card as a box, it fits neatly over the Pipe (Tatung's name for the bus expansion connector), and provides a monochrome video output and extension Pipe socket. Costing £50, it is an essential extra if you wish to use most CP/M programs.

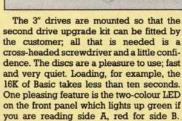
Switching on without the system disc in place brings the machine up in MOS, which on its own can be used as a machine code monitor If the disc is in place then the Disc Operating System loads automatically. It is this part of the software that gives CP/M compatability, the only problem being the unusual disc format. Type XBAS when in DOS and Crystal Basic will load from disc. This is an extensive version of the language. written by a British software house. The only problem I see is the inclusion of a command rather than any omissions: Pop forces a return from a subroutine, not to the calling routine but to the routine that called the calling routine! Probably very useful, but it may well cause brain damage when debugging programs.

The Einstein kept reminding me of the Dragon - perhaps it was just the diamondshaped zeros the text display produced. In theory, software should not be a problem: Tatung are making arrangements to get CP/M software available in 3" format, although don't expect it to be cheap. MSX software should also convert easily.

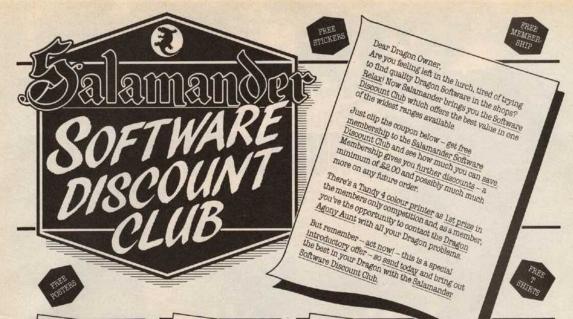
The obvious comparison is with the QL. If I had to choose which to buy it would not be an easy decision - the Sinclair machine is much more advanced, but the extra cost of the Einstein does include a reliable disc drive. Although there must be a worry about to what extent the Tatung will be supported by the major software houses - there isn't much available at present — the CP/M capability probably insures against the possibility of being left completely high and

Jeff Naylor





I have a few reservations about the keyboard; the feel is fine, but I would



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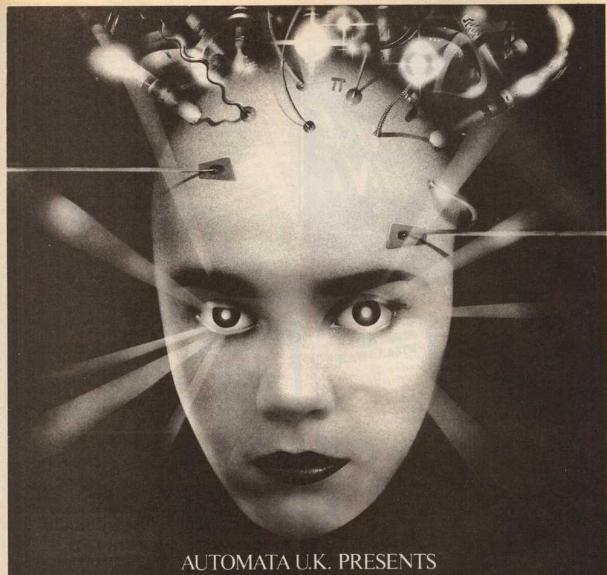
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18-24 OCTOBER 1984

Steady as you go, as you make your way through the Mad Maze written for CBM 64 by Chris Lea

n running, the program produces a maze over most of the screen, completely at random.

A white ball appears at the top of the screen, and the time is set to zero.

The object of the game is to move the white ball through the maze to the bottom of the screen.

Crashing into the walls returns the white ball to the start position. Instructions are included in the program.

#### Program Notes

X = Down

>= Left < = Right

I = Instructions

Q = Quits maze and draws new one. This may be necessary if the randomly produced maze is impossible to negotiate.

#### Listing Notes

Line 15 — the 's' is the Chr/Home Line 2010 — 'e' is Shift/E Graphic Line 3135 — '7 is Y Graphic Line 3210 — 'r' is Ctrl/Reverse Off



	Ø GOTO3010	2025 PRINT: PRINT
ı	1 CLR	2030 PRINT"111YOU TOOK "LEFT\$(RIGHT\$(TI\$
	10 POKE53281,11:POKE53280,13	,4),2)" MINUTES AND ";
	15 PRINT"s."	2035 PRINTRIGHT\$(TI\$,2)" SECONDS"
1	30 FORY=1106T01906STEP40:POKEY,160:POKEY	
	+54272,5:POKEY+36,160:POKEY+54308,5	2045 PRINTTAB(14)"QQQQANOTHER GO ?"
	35 NEXTY	2050 PRINT: PRINTTAB(15)" ( Y OR N )
١	40 A=1147 50 FORC=1T020	2055 POKE198,0 2060 GETP\$: IFP\$=""THEN2060
ì	60 FORD-ATON-24	2005 GETF\$- THEN 2008
Į	70 R=INT(ND(1)*13+1)	2070 IFP\$="Y"THENGOTO1
į	80 IFR (6THENPOKEB, 160: POKEB+54272, 5: GOTO	
ł	90	3000 REM *** TITLE PAGE ***
	85 POKEB+54272,11	3010 PRINT" SGOGGGGGGGGGG": POKE53280,9: POKE
	90 NEXTB	53281,9
	100 A=A+40	3020 PRINTTAB(12): FORU=1T016: PRINT" Ex";:
	110 NEXTC	NEXTU
H	120 TI\$="000000" 125 L=1124:M=L+54272:POKEL,81:POKEM,1	3025 PRINT: PRINTTAB(12)"*** MAD-MAZE ***
į	130 POKE198.0	3030 PRINTTAB(12): FORU=1T016: PRINT" PX" ::-
	140 GETQ\$- IFQ\$=""THEN140	3035 FORT=1T02500: NEXT
ı	145 IFQ\$="I"THEN3040	3039 REM *** INSTRUCTIONS ***
ì	150 IFQ\$="Q"THEN 1	3040 PRINT " POKE53280, 12: POKE53281, 12
i	155 IFQ\$="."THENX=PEEK(M+1)AND15: IFX=5TH	3050 PRINTTAB(14)" INSTRUCTIONS"
ì	ENPOKEM,11:GOTO125	3060 PRINTTAB(14) eeeeeeeeeee
		3070 PRINT"Q11THE COMPUTER WILL CREATE A
	EL,81:POKEM,1	DIFFERENT MAZE EVERY TIME YOU PLAY."
	165 IFQ\$=","THENX=PEEK(M-1)AND15: IFX=5TH	
ı	ENPOKEM,11:GOTO125 170 IFQ\$=","THENPOKEM,11:L=L-1:M=M-1:POK	3080 PRINT"]]YOU HAVE TO GUIDE THE BALL
ı	EL.81: POKEM.1	3090 PRINT TO THE BOTTOM, IN AS SHORT
ľ	175 IFQ\$="X"THENX=PEEK(M+40)AND15: IFX=5T	
ï	HENPOKEM,11:GOTO125	3100 PRINT THE WALL'S YOU WILL BE RETURN
i	180 IFQ\$="X"THENPOKEM, 11:L=L+40:M=M+40:P	ED TO THE START.
ì	OKEL,81:POKEM,1	3105 PRINT
		3110 PRINT THE YOU WISH TO QUIT A MAZE,
	HENPOKEM,11:GOTO125	PRESS 'Q'
		3120 PRINT"AND A NEW ONE WILL BE DRAWN!"
	OKEL,81:POKEM,1 200 IFL>1983THENGOTO2000	3130 PRINTTAB(4)"USE KEYS :-" 3135 PRINTTAB(4)"77777777
	210 IFL (1103THENPOKEM, 11:L=L+40:GOTO125	
	220 GOTO130	1X'
	2000 POKE53280,2:POKE53281,15	3150 PRINTTAB(6) QLEFT = '(' : RIGHT
	2010 PRINT"SP"	= '>'
		3160 PRINT"Q PRESS 'I' TO RETURN TO INS
	QQDID YOU GET LOST?": GOTO2025	TRUCTIONS"
	2014 IFTI\$>"000100"THENPRINTTAB(13)"QQQQ	
	QQWHAT KEPT YOU?":GOTO2025 2016 IFTI\$<"000010"THENPRINTTAB(15)"QQQQ	3210 PRINTTAB(6) Q4R PRESS ANY KEY TO CO
	QQBRILLIANT!!":GOTO2025	3220 GETK\$: IFK\$=""THEN3220
	2020 PRINTTAB(14)"QQQQQQYOU MADE IT"	3230 GOTO1

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### Hardware Review

#### 3 Octaves

Hardware Echo 1 music keyboard Micro BBC Price £99.95 Supplier LVL, Scientific House, Bridge Street, Sandiacre, Nottingham.

he biggest problem with any musical use of a micro, whatever the quality of the programming and the sound chip is the qwerty typewriter keyboard. Quite simply it is impossible to play in anything like a conventional keyboard manner — thus all pretentions to 'teaching' music are severely limited.

One attempt to overcome this problem came recently from Commodore who has introduced a simple mechanical, clip-on keyboard in which pressing a plastic 'key' presses down on a qwerty letter and produces a note, but though cheap it is limited to one octave and the actual keys are tiny.

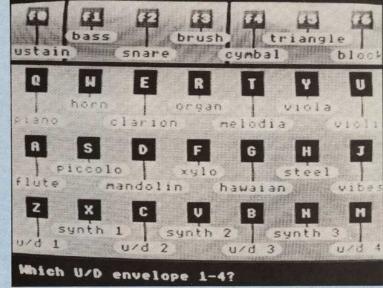
A more professional solution comes from LVL — a real three-octave keyboard with full-size music keys that plugs into the user port of the BBC (soon also for the Commodore 64). The device comes complete with software for the 64 to drive it and even has a six watt amplifier as an optional extra.

It's a keyboard you can actually play whether you are a one finger amateur or a three-fingered professional (well, there are only three channels to play around with so there is a top limit of three note chords).

There are two elements to the package: the keyboard and the software.

The keyboard is solidly made with a metal and plastic case and plastic keys. In comparison with the keyboards found on, say, Casios and small synthesizers the action (how much force you need to press the key down and register a note) is heavy. Whether you think that's bad or not is somewhat a matter of taste and in any event it may loosen up with a few months play. With a little care the keyboard should last a long time — it looks tough and reliable.





To set the system up the keyboard is first linked by ribbon connector to the BBC user port and then the software (on cassette or disc) is loaded up. If the keyboard is incorrectly connected you soon know it as the BBC lets out an almightly shriek.

While it is difficult to fault the keyboard it is nothing without software. This in turn depends on the BBC sound chip which is unfortunately, in comparison with dedicated music keyboards, no better than functional. To get interesting sounds from it takes quite a bit of programming.

The Echos sound software on disc or cassette is supplied free with the keyboard and operates in two basic modes — organ and synthesizer. The difference is less the kind of sounds produced and more that the organ consists of 17 pre-set sounds labelled things like piano, organ, mandelin, whereas the synthesizer mode lets you design your own sounds and store them in one of four presets where they then become available at a single key-press.

In the organ mode the pre-sets are simple enough; each qwerty key is labelled with what sound it produces although (and here's the rub) they all sound the same and none of them sound anything like their label: piano is a pleasant but unexciting organitype sound and mandolin is the same 'piano' sound with the jitters.

If you accept that — for reasons which are totally to do with the relative lameness of the BBC sound chip rather than the Echosound software — the sound choices must be limited, you can still have a lot of fun. Some of the pre-sets like viola and hawiian actually sound pretty pleasing — the latter 'boings' rather authentically.

There are a number of additional features

that may be introduced alongside the pre-set choice. Mostly these use white noise — base adds a background buzz at the same pitch as the note pressed, snare produces a short burst of white noise as the key is pressed. Other keys enable the pitch to be changed as well as the duration of any

In the synthesizer mode simple cursor key presses enable the parameters of the sound to be changed using the usual BBC envelope functions. My criticism here is that there is no explanation of what each parameter represents — you'll need the BBC manual for reference.

The software is, in general, pretty good—certainly enough to get you going. There are some features I'd have liked—how about a pitch bend option in which one of the top or bottom keys is allocated to bend played notes up or down by a given pitch?

LVL are promising more packages to be used with the keyboard package and software to teach the rudiments of music.

The price of £99.95 seems to me very reasonable indeed — as I've said the actual keyboard really is well made. The amplifier which complements the package boosts your volume to up to six watts and, in providing a tone control, enables you to improve the sounds considerably. At £49.95 it's possibly something to be bought later.

The LVL keyboard is excellent for anyone who has a BBC and is interested in music — as essential a peripheral as a printer or joysticks to my mind.

I can't wait to see the Commodore 64 version which makes use of the 64's considerably better sound chip.

Graham Taylor

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Even if you have already mastered machine code, we believe that them without paying royalties. ever if you have uneauly mustered musting in White Lightning's the time and problems saved by writing in White Lightning's FORTH - based high level language could revolutionise

commercial games writing for years to come.

IDEAL IDEAL is an Interrupt Driven Extendible Animation sub-Language, Once you have mastered IDEAL's easy to learn set of over 80 commands and just a little FORTH, you will be ready to produce arcade-quality games even if you don't know machine code. Up to 255 Sprites, each with its own user-defined dimensions can be moved around the screen (or memory), scralled, spun, can be moved around the screen for memory), scrolled, spuriting reflected enlarged or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and Sprite windows. Sprites can even stretch across several screens, so those difficult scrolling landscapes that form the basis of so many games are easy to achieve. Sinclair's own sound and many games are easy to acrieve, sinciair's own suuria and graphics commands such as CIRCLE, DRAW and BEEP are fully graphics community such as cinetic, providing other are fully supported, and there are some unique collision detection facilities.

MULTI-TASKING Because White Lightning uses interrupts, you can effectively run two programs at once. This means of course, that games like Space Invaders and Defender can be written without complex timing calculations. So while one

program smoothly scrolls the landscape, the second animates the other characters. This is undoubtedly one of White Lightning's most powerful features.

MARKETING AND PORTABILITY Although White Lightning uses an integer FORTH as its host language, programs can be written in a combination of BASIC, FORTH, IDEAL and

What is more, programs written in FORTH/IDEAL will be highly portable between the Spectrum and implementations under

When it comes to marketing your completed games, there's no problem either. In fact Oasis themselves will offer to market

SPRITE DESIGN White Lightning comes complete with a separate 20K program for developing the Sprites used in the main separate ZUN program for developing the optices asserting that system. Not only can you use this to design your own Sprites from system, trocomy carryou use uns to design your own aprices not scratch, it also cames complete with 168 pre-defined characters covering games like Asteroids, Pac-Man, Assault Course, Defender, Space Invaders, City Bomber, Lunar Lander, Frogger, Defender, Space Invaders, City Domber, Lunar Lander, Frogger, Centipede, Donkey Kong and many, many, more. These characters are ready to use or can be enhanced. And Sprites can be saved to

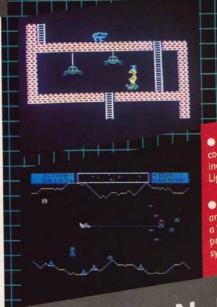
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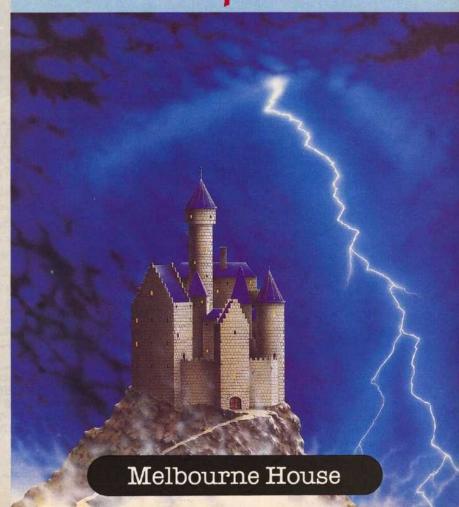
Castle Of Terror is a suberb graphic adventure game set in the 1880's when and where "Dracula" stories abounded. You are in a village near a large Castle in which the secretive Count lives. You must travel about the village, collecting items which may be of use to you on your bold mission.

You must also find out what your mission is by talking to the right people. But don't be fooled!

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# CASTLE of TERROR





#### **Impressive**

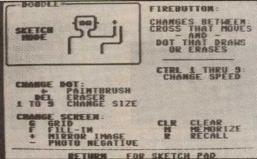
Program Doodle Micro CBM64 Price £14.95 Supplier Quicksilva, Palmerston Park House, 13 Palmerston Rd, Southampton, Hampshire.

number of programs have appeared recently which enable you to produce high resolution sketches on the Commodore 64. One of the latest is *Doodle* from Quicksilva, and provides a very quick and easy way of manipulating standard hi-res displays.

brings up a clear and helpful screen listing all the functions of the current mode.

Sketching is controlled with a joystick, and a nice feature is that you can select the speed of the cursor to suit yourself. The predefined shapes are very easy to obtain, and the circle and ellipse drawing is impressively fast. Likewise the shape filling routine is very quick indeed. For detailed work, areas of the sketch can be enlarged to about eight times normal size.

Naturally, your work can be saved and reloaded using tapes or disc, and some very impressive demo pictures are

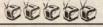


The program has ten modes which enable you to perform all the functions required—sketching free-hand, drawing lines, circles or boxes, controlling colour, handling repeating patterns or blocks of picture, etc. The mode can be changed at any time by pressing the appropriate function key, and if you are not sure of the commands, pressing return

supplied on the disc with the program. Sketches can also be dumped out to a printer, various popular models being supported.

Altogether, this is an excellent utility. It is a quick and easy way to produce hi-res pictures, and is well documented.

Richard Corfield



#### Hazardous

Program Star Avenger Micro Amstrad CPC 464 Price £8.95 Supplier Kuma Computers Ltd., Unit 12, Horseshoe Park, Pangbourne, Berkshire, RG8 7JW.

n Star Avenger you take command of a starfighter on a single handed mission to destroy the enemy HQ. This is located deep inside the enemy'shome planet, and heavily defended by constant barrages of accurate missiles.

First there is a hazardous flight across the surface of the planet, through a series of caverns and a narrow tunnel. At this point the missile defences are supplemented by a series of fireballs, huge bats, and fighter aircraft.

Then comes a flight across a city and into a maze where all your pilots skill will be required to negotiate the winding passages.

Next comes a fortress heavily defended by accurate antiaircraft guns, followed by a tunnel with a number of force fields along its length, which need careful judgement to pass through.

The excellent graphics, sound and overall presentation of the game are slightly let down by the choice of controls, but this doesn't spoil the game.

Greg Pearson

CCC C

#### Slick

Program Stock Car Micro
Electron Price £6.95 Supplier
Micro Power, 15 Sheepscar
Street South, Leeds LS7 1AD.

Start your engines, put the
car into gear, watch out for
the oil slicks, take the
corners with care, stay out of
the way of the computer
controlled cars and you are off.

For the un-initiated, stock cars are either the racing to the death of old cars made to go for the one occasion or weird looking racing cars with high powered engines.

This Stock Car is of the high powered variety, where you can take your machine onto one of six circuits with the options of difficulty. You can race around by yourself with the computer in control of three

other cars, or you can race against an opponent.

Obviously simulating the real thing on a computer is rather difficult. Apart from the rather shaky forward movement of the cars and near lack of sound use (in true stock car racing the vast amount of noise is an important part of the excitement), Micro Power have come up with a very good interpretation.

Each of the controlled cars have four gears with associated difference in speed. Steering is by left and right key operation. If you do not change to the right gear at the right part of the circuit then, as in the real thing, you smash into the fence.

I found it an exciting game and a refreshing change from a lot available at present.

Fred Short



#### Animated

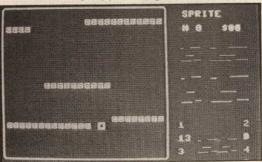
Program Graphics Editor Price £14.95 Micro Commodore 64 Supplier Romik Software, 272 Argyll Avenue, Slough SL1 4HE.

here are a number of graphics utilities available for the Commodore 64, but most of them are either sprite, character or sketchpad programs. The new Graphics Editor from Romik Software is unusual in that it combines all of these features. When the program has loaded, you are presented with a menu giving you

of good features. For example, a window is provided to display combinations of new characters.

The sprite editor is very similar in use to the character editor, and enables you to create up to 64 sprites in either standard or multi-colour modes. The editing is controlled by straightforward single keystroke commands, and sensibly these are the same as in the other two editors. A facility to create animated sequences of up to 16 sprites is also provided.

The screen editor enables you to build up screen images using either the standard cha-



three options — a character editor, a sprite editor, and a screen editor.

The character editor provides all the facilities you need to define your own customised character sets. It is easy and quick to use, and has a number racter set, or one of your redefined ones.

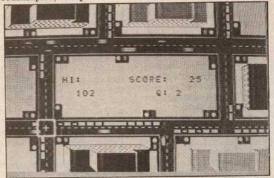
This is a well planned and nicely presented package. The instructions and commands are clear and consistent.

Richard Corfield

#### Seeing red

Program Traffic Micro CBM 64 Price £7.95 Supplier Quicksilva, Palmeston Park House, 13 Palmeston Rd, Southampton, Hampshire. builds up, and it soon becomes pretty difficult to avoid long queues developing at the lights. If the jams become too bad, your turn is ended and you have to start again from the beginning.

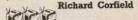
This is an unusual idea for a game, and it is nicely presen-



raffic from Quicksilva is an unusual and original game. In it you are presented with an aerial view of a set of road junctions controlled by traffic lights. Your job is to maintain smooth traffic flow around the road system by changing the lights to avoid the build up of traffic jams. You score points while the traffic flows smoothly, and if you successfully cope with the first traffic scheme, you move on to a more difficult one.

Each road plan starts off with very little traffic on it, but the number of vehicles quickly ted. The graphics are simple, but quite effective. Fuller instructions would have been very welcome though, as when queues start to build up various bleeping noises start and numbers appear on the screen—some of them flashing. The meaning of all this is not at all obvious, and it is never explained.

This game is good fun for a while, but after a few goes it starts to become as frustrating as being stuck in a real traffic



#### Up the river

Program River Raid Price £7.99 Micro Spectrum 48K Supplier Activision UK Inc., 15 Harley House, Marylebone Road, London NW1 5HE.

Activision have a long held reputation for their video games. Now they have adapted some of these for home computers.

River Raid is a shoot-em-up. You fly a jet, which crashes if it flies over land — odd! Once started the river scrolls continuously while you move left or right, accelerate or decelerate, taking pot shots at anything that moves.

Your progress is marked by bridges which you blow up, amassing even more points. But all this flying eats fuel so you fly over fuel dumps to refill your tanks, and guess what ... they become increasingly scarce as you proceed. And inevitably the enemy return fire later too.

All this makes for a few hours of gory fun, the graphics are serviceable; the sound almost enough to make you think of arcades. Where River Raid falls down is that, compared with the state of the art, it is desperately flat.

Implementation is only fair.



#### Zen

Program Zenji Price £7.99 Micro Spectrum 48K Supplier Activision UK Inc., 15 Harley House, Marylebone Road, London NW1 5HE.

Conversation overheard recently at the local Chinky:

"Tell me, oh Master, what is Zenji?"

"To quote its designer, my child, 'It is a new kind of experience whose strategy lies ... in sensing the right move and trusting your intuition'."

"But what is it?"

"It is Zen and the Art of the Arcade Game."

"Ahh. Arcade action."

"Not really. Though you try to beat the clock there is nothing



to shoot. Instead you move a head, revolving blocks to try and create a golden path. In that instant Zenji occurs."

"And I score points?"
"I quote: 'There is no

conquest'."
"But there is a High Score

"But there is a High Score table!"

"Try to enter your name though. That takes speed and skill as it is too sensitive." "What is the winning ... sorry.

most sublime strategy?"
"I quote again: "There is no

"I quote again: "There is no planning'."

"That must make it very random."

"Try it. You will see."

(Disciple plays Zenji. Thirty seconds later ... )

"And what have you learnt, little grasshopper?"

"That Zenji is an infuriating waste of time. Obviously I am not on a high enough spiritual plain."

(Master departs. Disciple Loads Space Invaders.)

John Minson



#### Dig this

Program Rubble Trouble Micro Electron Price £6.95 Supplier Micro Power, 15 Sheepscar Street South, Leeds LS7 1AD.

uring the years 2001 to 2003 a third world war took place. The bomb went off and you were left nothing better than a caveman, to face the deadly mutant Krackets who love nothing more than human flesh.

To survive you must kill the ever increasing numbers of Krackets, and being a caveman means that all you can do is push a piece of rock (which form the maze walls) onto them. Miss the Kracket and the rock bounces back and kills you. The background radiation

The return to menu routine is clumsy and there is no high score table. Several joysticks are catered for though, and with one of these it should be suitable for younger players.

John Minson

is rising so you must hurry before the rocks disintegrate or the radiation kills you off. Green rocks give bonus points but do not attempt to move a rock containing a bomb — it may start yet another holocaust. The Krackets themselves develop from eggs, so you may be able to kill them off before they hatch.

That then is the story line. It's very topical and sounds full of doom and gloom but I was fascinated and found it full of fun. Granted it's very like Pengo and Mr Wiz, but it's obviously been compiled by someone with a super sense of humour.

Whatever you do, do not miss out on the screen option of reading the instructions and full background story to the game. It was the sheer delight to see such originality using a cinema screen credit type method of presenting the information.

Such humour in a game, especially one with a rather gloomy background story, is refreshing. A very amusing, well thought out, fun packed game.



Fred Short

#### **Nasties**

Program Kentilla Price £6.95 Micro Spectrum 48K Supplier Micromega, 230-236 Lavender Hill, London SW11 1LE.

ong before Codename
Mat, Derek Brewster
wrote a Basic adventure
called Velnor's Lair. Now Grako has inherited Velnor's power and once again Caraland is
threatened, only this time in
machine code and with illustrations.

Kentilla is actually quite sophisticated. It is populated by various wandering nasties. Bide your time and kill them one by one, if you're wise. It also has a pseudo-interaction



system, though unlike *The Hobbit*, saying virtually
anything will get the same
response.

It's good to see graphics so intelligently used. Almost every location has a small but attractive illustration, and at times you'll need these to find your way.

Caraland appears to provide a very concrete framework for this adventure, with its own myths and monsters. Examining is important, as is the ability to look into the next location.

There is a useful editor for entries, with recall of the previous command, most of which are two words, drawing on a largish vocabulary.

In short a difficult challenge for the serious adventurer, but perhaps lacking character.

John Minson

#### Pill popping

Program Mr Robot Micro CBM 64 Price £10.00 Supplier Beyond, Durrant House, Herbal Hill, London EC1. robot testing course. This consists of a series of platforms connected by ladders, escalators and greasy poles. You must collect all the power pills on each platform before you can move onto the next screen.

So far, so standard — the game is not particularly original, but it is well presented and is quite good fun. However, when you get tired of playing the standard screens, the game has the unusual feature of allowing you to design and play your own versions.

This robot factory, as it is called, is an excellent idea and is very easy to use. You can select any of the features of the game you like, arrange on the

#### Chills

Program Chiller Micro CBM 64 Price £1.99 Supplier Mastertronic, Park Lorne, Park Road, London NW8.

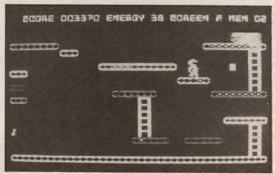
omputer games based on just about everything have appeared over the last year or two, but Chiller must be about the first to be based on a pop video — Michael Jackson's Thriller in fact.

In the game you have to rescue your girlfriend who is imprisoned in a haunted house some distance away. To reach her you must make your way through five screens full of hazards — the forest, the cine-

as contact with any of them saps your energy. If you rescue the girl from the house, the two characters must be guided back through all five screens to safety.

This game is one of the Mastertronic £1.99 series, and it certainly gives the lie to those who claim that good computer games cannot be produced so cheaply. It is as good as most games at three or four times the price, and better than quite a few of them.

The basic elements are pretty standard arcade formula, but the whole game is well presented with nice graphics and sound, and it is sufficiently challenging and interesting to provide more lasting enjoyment than most games. It cer-



r Robot from Datamost fits into one of the standard arcade game styles, but does have a feature which sets it apart from other similar games.

In the game itself, you have to guide Mr. Robot round the screen as you wish, then play on your new screen.

One black mark though on the cassette version, you cannot save your new screen designs.

Richard Corfield



ma, the ghetto, a graveyard and then the haunted house

At each stage, various ghouls, zombies, bats and other nasties must be avoided tainly makes most £6 to £8 games look ridiculously expensive.

Richard Corfield



#### Side swipes

Program Dragon World Price £5.95 Micro Spectrum 48K Supplier Britannia Software Ltd, Cardiff Workshops, Lewis Road, East Moors, Cardiff CF1 5EG.

Gilsoft's Quill guarantees competent adventures but many are no more than that! It still takes imagination to make spending hours over a hot keyboard worthwhile.

Britannia seem to have cracked it with *Dragon World* though. Some adventures are 'humorous'; this one is genuinely funny too. It plays with the conventions of Sword and Sorcery while taking sideswipes at other well known games.

For example, your quest is to find a Princess. Hardly original, but you find her almost immediately; dealing with her troll guard is the problem.

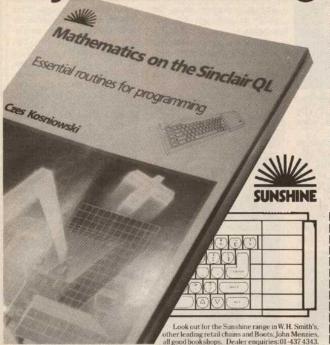
Add to this some very witty, unexpected and often insulting responses, and you'll probably want to continue for laughs alone.

Not that the adventure itself is bad. There are lots of locations, lavishly described, proving that vivid words beat graphics for involvement every time. Objects aren't too common but those that you find are interesting.

This is a great start for Britannia's Micro World series, and should appeal to all but the most humourless.

CCC John Minson

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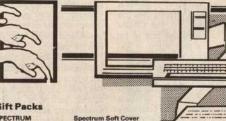
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## Put on the map

Philip Hickling's program will map your microdrive in graphic detail, on the Spectrum 48K

his program is for use with the Spectrum with Interface 1 and Microdrive. Its purpose is to display graphically the use of each sector on a microdrive cartridge.

Each cartridge is divided into sectors of 512 bytes, or ½K. Whenever a microdrive is accessed, a map of the cartridge is created in memory, in space below the program area. This map remains while the microdrive is actually in operation, or while a stream is directed to the microdrive.

The map consists of 32 bytes, in which each of the 8 bits represents a sector on the cartridge. The bit is set if the corresponding sector is used, or cannot be used. In all, the map has 256 bits, so in theory up to 128k of cartridge could be accessed, although Sinclair cartridges generally have only 170-190 sectors. Because of this, bits which correspond to sectors which do not physically exist on the cartridge are also set. Thus, a newly formatted cartridge will only have part of its map shown free.

Use of the program provides an insight into the way in which files are saved — not in the sequential manner from the beginning to the end of the cartridge that might be expected. Also, it would seem that cartridges have a capacity of less than 100K due to shortage of tape inside the cartridge, not faults on the tape, as inferred in the manual. Evidence for this is that a newly formatted cartridge has one long block of free space, rather than a block of 100K interspersed with patches of unavailable space.

#### Program notes

Line 40 - creates a map in memory of the cartridge currently in drive 1. Since nothing is prin-' to the file, the cartridge is altered. Line 70 - reads the relevant part of the map into the variable 'c'. Under normal conditions, the map of the cartridge in drive 1 resides in the 32 bytes from address 23792 onwids. Line 120 effectively close; stream #4 without writing anything to the cartridge. - removes the map from the Line 150 screen while another cartridge is being mapped. Lines 170-260 - initialise the array of powers of 2, and set up graphics. Lines 270-360 - set up the screen. Lines 370-410 - wait for Enter to be pressed before mapping a cartridge. Also initialise the free space total for the cartridge to be mapped to zero.

Lines 420-480 - routine to convert a number

into a sequence of colour

control codes and spaces, equivalent to binary.

The letters A and B in Line 320 are entered in graphics mode. Take care not to omit the commas in Lines 150 and 390.

#### Variables

Simple: c — parameter for binary conversion routine at Line 470, containing one byte of map. e — total amount of memory available on cartridge, in K.

Control: a — used throughout program in looping.

b - nested in main loop.

d—used in binary conversion routine, to step through powers of 2.

String: as — output from binary conversion routine, consisting of eight sets of colour codes, each followed by a space.

bs — string of spaces for blanking part of screen.

Subscripted: a — one dimensional array of eight elements, containing the powers of 2 where  $a(x) = 2 \uparrow (x-1)$ .

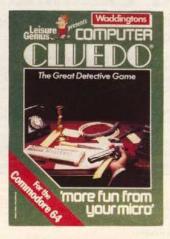
#### 1 REM

#### Microdrive Map Philip Hickling May, 1984

10 GO SUB 170 20 POKE 23693,40: BORDER 5: CL GO 5UB 270 OPEN #4;"m";1;"mapfile" FOR a=0 TO 7 FOR b=0 TO 3 LET c=PEEK (23792+a\*4+b 30 40 50 (23792+a\*4+b) SUB 420 90 PRINT 3 #2+1, b #8; OVER 1; 100 NEXT 110 CLEAR # PRINT AT 21,21;e;" k" 120 130 370 AT 21,21,AT 0,0; OVER GO SUB 140 PRINT 150 1; b\$ 160 GO TO DIM a (8) DIM b\$ (512) FOR a=0 TO 170 180 LET a (a+1) =2†a 190 200 210 FOR a=0 TO 7 POKE USR "a"+a,128 POKE USR "b"+a,129 NEXT a 220 230 240 250 RETURN 260 FOR a=168 TO 56 STEP -16 PLOT 0,a: DRAW 255,0 PLOT 0,a-9: DRAW 255,0 270 280 NEXT a 300 330 NEXT a 340 PRINT AT 19,12; PAPER 4;" " PAPER 5;" - Used" 350 PRINT AT 20,12; PAPER 6;" " PAPER 5;" - Free" 360 PRINT AT 21,6;"Free space -370 PRINT AT 17,0; "Insert carts idge and press ENTER" 380 IF INKEY\$ CHR\$ 13 THEN GO 380 400 LET 8 = 0 410 RETURN 420 LET 34 430 FP PRINT AT 17,0,, 420 LET a\$=""
430 FOR d=7 TO Ø STEP -1
440 LET a\$=CHR\$ 17+CHR\$ (6-2\*(c)
>=a(d+1))+" "+a\$
450 IF c<a(d+1) THEN LET e=e+.5
460 LET c=c-a(d+1)\*(c)=a(d+1) LET c=c-a(d+1) \*(c>=a(d+1))
NEXT d RETURN

# Ingenious...









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## **Detailed examination**

Stop Poking around in the dark and take a look at the QL Disassembler by Keith Poole

ny serious code programmer at some point will want to examine the QL's memory in detail, maybe with a view to using a Rom routine, or perhaps from idle curiosity.

This program, QL Disassembler, will allow you to do just that, and should prove useful to any QL enthusiast. The listing itself will be printed over two weeks, with accompanying notes on the program and the 68000 chip.

#### **Program Notes**

The instruction set of the 68000 can be split into 13 groups depending on the top four bits of the op-code. Each of these groups defines a certain set of operations.

Group 0: Immediate and bit instructions (ADDI etc)

Group- 1-3: Move (1=bytes, 2=long words, 3=words)

Group 4: Miscellaneous instructions
Group 5: Ouick set and decrement branch

instructions

set and decrement branch ions

Group 6: Branch instructions
Group 7: Moveq instruction

Group 8: Arithmetic 1 (or, div and sub)
Group 9: Subtract

Group A&F: User defined instructions
Group B: Arithmetic 2 (eor and cmp)
Group C: Arithmetic 3 (and & multiply)

Group D: Add Group E: Shift and rotate

Addressing Modes

The 68000 has 12 addressing modes. These are shown in the normal motorola assembler format, except for the program counter relative mode (eg. 14A(pc)) which is followed by the effective address separated by 1, ie, jsr 2068(pc)! 80CS.

This is not available for the other pc-relative mode because this depends on the contents of address or data registers which cannot be determined by the disassembler.

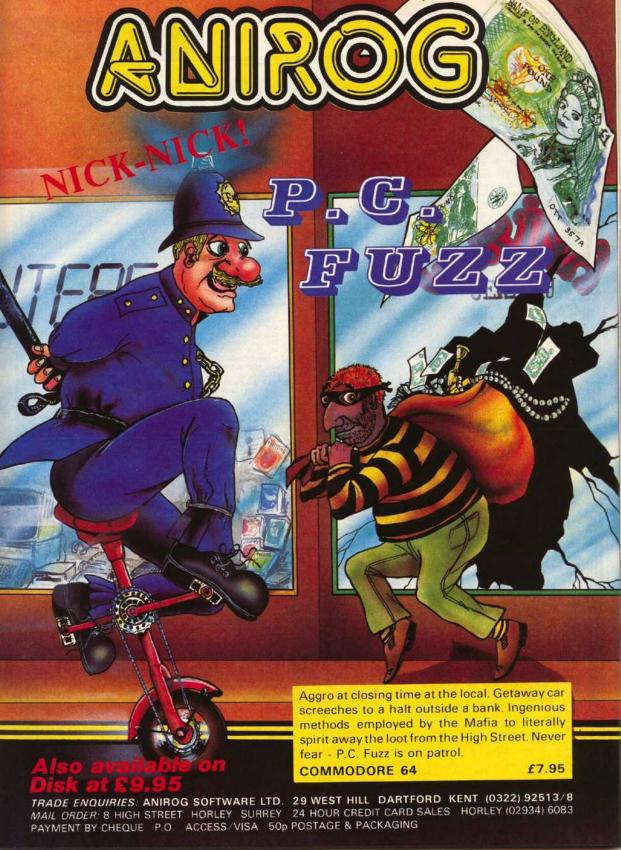
```
650 IF slice(rest, 3, 3)=1 AND bot MOD Z=1 THEN
20 CLEAR
                                                                                           op#="movep
                                                                                  650
TO THE 7
                                                                                           IF slice(rest,6,1)=1 THEN 
ops=ops&".1":1qt=1
                                                                                  670
40 agh=0:DIM cc#(15,2):setup:lgt*0
50 digit#="0123456789ABCDEF"
                                                                                  680
SO MODE 4:CSIZE 1,0:CLS £0:BORDER £0,5:CLS:AT B,15:PRINT
                                                                                  690
                                                                                           ELSE
                                                                                  700
                                                                                              op#=op#&".w"
"Dissasembler v1.0":AT
                                                                                           END IF
                                                                                  710
9,14:PRINT 1984 LKY Software"
                                                                                           p=PEEK_W(s+op)
reg$="d"%(bot DIV 2):ad$=hex$(p)%"
                                                                                  720
70 op#=" ":lin=18
                                                                                  730
BO INPUT E0, "start address" (a#:s=dec(a#)
90 IF s/2<>INT(s/2) THEN s=s-1
                                                                                  (a"&(rest MOD 7)&")":op=op+2
                                                                                           IF rest DIV 128-1 THEN op#-op#&" "%reg#&"
                                                                                  740
100 REPeat loop
                                                                                                              "%reg#%","%ad$
                                                                                   750
110 top=PEEK(s) DIV 16:bot=PEEK(s) MOD
                                                                                           FLSE
                                                                                  760
16:rest=PEEK(s+1):op=2
                                                                                               op#=op#%" "%ad#%","%reg#
                                                                                   770
 120 SELect DN top
                                                                                           END IF
                                                                                  780
  30 ON top=0:group0
                                                                                   790 ELSE
 140 ON top=1 TO 3:groups
                                                                                  800 ops=types(slice(rest,6,2))
810 IF slice(rest,6,2)=2 THEN
 150 DN top=4:group4
 160 DN top=5:group5
                                                                                            p=PEEK_L(s+op):op$=op$&" f"&hex$(p):op=op+4
                                                                                  820
  70 ON top-6: groups
                                                                                  830 FLSE
 180 ON top=7:group7
                                                                                           p=PEEK_W((s+op))
                                                                                  840
 190 ON top=8:group8
                                                                                  850
                                                                                            IF slice(rest,6,2)=0 THEN p=p&&255
op#=op#&" f"&hex#(p):op=op+2
 200 DN top=9:group9
                                                                                   960
 210 DN top=10,15:uses
                                                                                  870 END IF
 220 ON top=11:groupb
                                                                                  880 op#=op#%","%raddr#(slice(rest,3,3),slice(rest,0,3))
890 SELect ON bot
 230 ON top=12:groups
 240 DN top=13:groupd
                                                                                   900 DN bot=6:00 = "add1 "&op#
 250 ON top=14:groupe
260 END SELect
270 IF agh=1 THEN op=2:agh=0
                                                                                   910 ON bot=2:op#="and:"%op#
                                                                                  920 ON bot=12:op#="cmp1"%op#
930 ON bot=10:op#="eor1"%op#
940 DN bot=0:op#="or1"%op#
950 ON bot=4:op#="sub1"%op#
280 col=30:col=col-LEN(hex*((a)))
290 PRINT hex*((a));" ";
300 FOR i=0 TO op-1 STEP 2
                                                                                   960 DN bot=REMAINDER
 310 t#=hex#(256*PEEK(s+1)*PEEK(s+i+1)):1F LEN(t#)
<4 THEN t#=FILL#("0",4-LEN(t#))
                                                                                   970
                                                                                          op=2
                                                                                           xx=slice(rest, 6, 2) +4*(bot MOD 2)
 2.t#
                                                                                   990
                                                                                           SELect ON xx
ON xx=5:op#="bchg":im=0
 320 PRINT t#::col=col-LEN(t#):END FOR 1
                                                                                   1000
                                                                                           ON xx=1:op#="bchg":im=1
ON xx=6:op#="bchr":im=0
ON xx=2:op#="bchr":im=0
ON xx=7:op#="bset":im=0
                                                                                   1010
 340 PRINT FILL*(" ",col);op*
350 op*=" ":1gt=0
                                                                                   1020
  360 s=s+op
                                                                                   1040
  370 lin=lin-1: IF lin=0 THEN dly:lin=18
                                                                                            ON xx=3:op*="bset":im=1
                                                                                   1050
  380 END REPeat loop
                                                                                            DN xx=4:op#="btst":im=0
                                                                                   1060
  390 DEFine FuNction dec(a#)
                                                                                            ON xx=O:op#="btst":im=1
                                                                                   1070
  400 LDCal i, tot
                                                                                            END SELect
                                                                                   1080
  410 tot=0
                                                                                   1090 IF slice(rest,3,3)<>1 THEN
1100 IF im=1 THEN
  420 FOR i=1 TO LEN(a$):tot=tot*16*val(a$(i))
 430 RETurn tot
                                                                                           op#=op#&" "&hex#(PEEK_W(s+op))&","
                                                                                   1110
  440 END DEFine
                                                                                   1120 op=op+2
  450 DEFine Function val(s$):REMark return hex value of s$
                                                                                   1130
                                                                                            op#=op#&addr#(slice(rest.3.3).slice(rest.0.3))
  460 LOCal t
                                                                                   1140 ELSE
 470 t=s$ INSTR "abcdef":IF t>0 THEN RETurn t+9
480 t=s$ INSTR "ABCDEF":IF t>0 THEN RETurn t+9
490 IF s$(="0" OR s$>"9" THEN
                                                                                           op#=op#&" d"&hex#(bot DIV 2)&", "%raddr#(slice
                                                                                   (rest, 3, 3), slice(rest, 0, 3))
                                                                                   1160 END IF
          RETurn 0
                                                                                   1170 ELSE
  510 ELSE
                                                                                   1180
                                                                                         op#=op#&" error'
 520 RETurn s*
530 END IF
540 END DEFine
                                                                                   1190 END IF
                                                                                   1200 END SELect
  550 DEFine Function hes#(a)
560 LDCal str#,main,b
570 str#="":REPeat main
580 a=a/16:b=(a-INT(a))*16:a=INT(a)
                                                                                   1210 END IF
                                                                                   1220 END DEFINE
                                                                                   1230 DEFine PROCedure groups
                                                                                   1240 op#="move"
                                                                                   1250 SELect ON top
  590 str#=digit#(b+1)&str#
                                                                                  1250 ON top=1:op#=op#&".b"
1270 ON top=2:op#=op#&".1":1gt=1
1280 ON top=3:op#=op#&".w"
1290 END SELect
  600 IF ac=0 THEN EXIT main
  610 END REPeat main
  620 RETurn str≢
  A30 END DEFINE
  640 DEFine PRDCedure group0-
```

```
2040 ops="b"&ccs(bot)%" "&nexs(s+oper+2)
1300 op#=op#%" "&addr#(slice(rest,3,3),slice(rest,0,3))
  ,"Saddr#(slice(rest,6,
                                                                     2050 END DEFine
2)+4*(bot MOD 2),bot DIV 2)
1310 END DEFine
                                                                     2060 DEFine PROCedure group7
                                                                     2070 IF (bot MOD 2) THEN
                                                                              op#="error":agh=1
1320 DEFine PROCedure group4
                                                                     2080
                                                                     2090 ELSE
1330 SELect ON bot
1340 ON bot=2:op#="clr"&type#(slice(rest,6,2))&"
                                                                              op#="moveq f"the: #(rest) %", d"&(bot DIV 2)
                                                                     2100
                                                                     2110 END IF
 &addr#(slice(rest, 3,3), slice(rest, 0,3))
                                                                     2120 END DEFine
                                                                     2130 DEFine PROCedure group8
1360
        'IF slice(rest,6,2)=3 THEN
                                                                     2140 IF slice(rest, 6, 2)=3 THEN
2150 IF (bot MOD 2)=1 THEN
            op#="move.w
1370
                             "&addr#(slice(rest.3.3).slice
(rest,0,3))&",ccr"
                                                                                  op#="div="
      ELSE
                                                                      2150
                                                                     2170
                                                                               ELSE
1390
             op#="neg"&type#(slice(rest,6,2))&"
 %addr #(slice(rest, 3, 3), slice(rest, 0, 3))
                                                                               op≢="divu"
END IF
                                                                     2190
         END IF
                                                                               op$=op$%" d"&(bot DIV 2)&", "&addr #(slice
1410 ON bot=0
                                                                     2200
                                                                     (rest, 3, 3), slice(rest, 0, 3))
       IF slice(rest,6,2)=3 THEN
           op#="move.w sr,"%addr#(slice,slice(rest,0,3))
                                                                     2210 ELSE
                                                                           IF slice(rest, 3,5)=1 AND (bot MOD 2)=1 THEN ops="shod d"&(rest MOD 8)&",d"&(bot DIV 2)
        ELSE
                                                                      2230
1450
           op#="negx"&type#(slice(rest,3,3))%"
                                                                      2240
                                                                              ELSE
                                                                                 op#="or"&typo#(slice(rest,b,2))

IF (bot MOD 2)=1 THEN

op#=op#&" d"&(bot DIV 2)&","%reddr#(slice
"&addr#(slice(rest,3,3),slice(rest,0,3))
                                                                      2250
1460 END IF
                                                                      2260
1470 ON bot=6
       IF slice(rest,6,2)=3 THEN
    op#="move.w "%addrf(slice(rest,3,3))
                                                                     (rest, 3, 3) , slice(rest, 0, 3))
 490 op#="move.w "
slice(rest,0,3))&",er"
                                                                               ELSE
1490
                                                                     2280
                                                                     2290 op=op#&" "%addr#(slice(rest.3,3),slice(rest.0,3))&",d"&(bot DIV 2)
       ELSE
1510
           op#="not"&type#(slice(rest,3,3))&"
                                                                      2300
                                                                                 END IF
"&addr#(slice(rest,3,3),slice(rest,0,3))
                                                                              END IF
                                                                      2310
1520 END IF
                                                                      2320 END IF
1530
      ON bot=8: sub8
                                                                      2330 END DEFine
                                                                      2340 DEFine PROCedure group9
2350 IF (bot MDD 2)=1 AND slice(rest,3,3)=0 THEN
2360 opt="subs"Etype#(slice(rest,5,2))E"
1540 ON bot=10
       IF slice(rest,6,2)=3 THEN
1550
1560
           op#="tas "%addr#(slice(rest,3,3)
                                                                     d"&(rest MOD 8)&",d"&(bot DIV 2)
,slice(rest,0,3))
                                                                      2370 ELSE
2380 IF
1570
       ELSE
                                                                            IF slice(rest, 6,2)=3 THEN
            op#="tst"&type#(slice(rest,6,2))&"
1580
                                                                      2390
                                                                                 op#="sub-
"&addr#(slice(rest,3,3).slice(res
                                                                                 IF bot MOD 2=0 THEN 
op#=op#&".w "
ELSE
                                                                      2400
E.O.31)
                                                                      2410
1590 END IF
                                                                      2420
1600
       ON bot=14:sub14
                                                                                 op#=op#h".1
                                                                      2430
       ON bot=12:movemf
1610
                                                                      2440
1620
      ON bot=REMAINDER
1630
                                                                                 op#=op#%addr#(slice(rest,3,3),slice
                                                                      2450
         xx=slice(rest,6,2)+4*(bot MOD 2)
         ON xx=6:op#="chk":r#="d"
ON xx=7:po#="thk":r#="d"
                                                                      (rest,0,3))&",a"&(bot DIV 2)
1640
                                                                      2460
                                                                               ELSE
1650
                                                                      2470
2480
                                                                                  op#="sub"&type#(slice(rest,6,2))
1660
                                                                                  IF (bot MOD 2)=1 THEN
IF slice(rest, 3, 3)=1 THEN ops="error":agh=1
           DN xx=REMAINDER :op#="error":r#="a"
1680 END SELect
1690 op#=op#%" "%addr#(slice(rest,3,3),slice
                                                                      2490
                                                                                     op#=op#&" d"&(bot DIV 2)&", "&raddr#(slice
                                                                      2500
                                                                      (rest, 3, 3), slice(rest, 0, 3))
(rest,0,3))%","%
1700 END SELect
       0,311%","&r#&(bot DIV 2)
                                                                             ELSE
                                                                      2510
                                                                                    op#=op#&" "&addr#(slice(rest,3,3),slice
1710 END DEFine
                                                                      2520
                                                                      (rest,0,3))%",d"%(bat DIV 2)
2530 END IF
1720 DEFine PROCedure group5
1730 IF rest DIV 64=3 THEN
1740 IF bot=1 THEN
                                                                      2530 END IF
                                                                      2550 END IF
2560 END DEFine
1750
            op#="ra"
1760
         ELSE
 1770
                                                                      2570 DEFine PROCedure user
            opf=ccf(bot)
         END IF
1780
                                                                      2580 op#="udef"
1790
         IF slice(rest,3,3)=1 THEN
                                                                      2590 END DEFine
                                                                      2600 DEFine PROCedure groups
           p=PEEK_W(s+op):op=op+2
op#="db"&op#%" d"&(rest MOD 8)%"
                                                                      2610 IF (rest DIV 64)=3 THEN
                                                                               op#="cmpa"
                                                                      2620
"8hex#(s+p+4)
1820 ELSE
1830 IF op#
                                                                      2630
                                                                               IF bot MOD 2=1 THEN
                                                                                   op#=op#&".1":1gt=1
                                                                      2640
          IF op#="ra" THEN op#="et"
1840
                                                                      2650
                                                                               FLSE
            op#="s"&op#&" "&addr#(slice(rest,3,3)
                                                                      2660
                                                                                  ор‡≈ор‡&".и"
 rest MOD 8)
                                                                      2670
                                                                               END IF
         END IF
                                                                               op$=op$%" "%addr$(slice(rest,3,3)
                                                                      2680
1860 ELSE
                                                                      ,slice(rest,0,3))&",a"&(bot DIV 2)
       IF bot MOD 2=1 THEN
1870
            op#="subq"
                                                                      2690
                                                                                IF type#(rest DIV 64)=".1" THEN Igt=1
1880
1890
                                                                       2700 ELSE
                                                                               IF bot MOD 2=1 THEN
1900
         op#="addq"
END IF
                                                                       2710
1910
                                                                                  op#="cmpm"&type#(rest DIV 64)%"
         p=bot DIV 2:IF p=0 THEN p=8
                                                                      (a"&(rest MOD 8)&")+, (a"&(bot MOD 2)
1920
         op#=op#&" f"&hex#(p)&","&addr#(slice(rest,3,3)
1930
                                                                      2730
                                                                              ELSE
rest MOD 8)
                                                                      2740
                                                                                  op#="cmp"%type#(slice(rest,6,2))%"
                                                                      "&addr#(slice(rest,3,3),slice(res
1940 END IF
1950 END DEFine
                                                                       t,0,3))&",d"&(bot DIV 2)
2750 END IF
1960 DEFine PROCedure groups
                                                                      2760 END 1F
1970 IF rest=0 THEN
1980 oper=PEEK W(s+op):op=op+2
                                                                      2770 END DEFine
         IF oper >32767 THEN oper =- (65536-oper)
                                                                       2780 DEFine PROCedure groups
2000 ELSE
2010
        oper=rest
         IF oper >127 THEN oper =- (256-oper)
2030 END IF
```

continued next week



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## Out, out, brief candle

Enliven your birthday celebrations with this novel applications program for the Dragon by Nicholas Smith

There is a simple Basic program to enable the 'Family of the Eighties' to have some fun with their computer at children's birthday parties.

No doubt most families with young children will still wish to carry out the traditional ceremony involving the real birthday cake complete with flaming candles. However, the computerised version could be used as a forerunner to the main event, letting each child take a turn to blow out the flickering candles displayed on the television screen.

To run this program, the computer must be connected to a tape recorder, via the Input from Tape lead connected to the Ear socket on the recorder. A microphone must be connected to the Mic socket on the recorder. The Play and Record buttons on the tape recorder must be pressed down by holding down the lever inside the cassette compartment (which is normally held by the

tabs on the cassette), then pressing Play and Record. When the candles flicker during the program, blow into the microphone. Do several trial runs to get the volume level on the recorder right.

The unscrupulous parent can fix the arrangements to ensure only the Birthday Child' can succeed in blowing out the candles by keeping the volume control of the tape recorder turned down until the turn of the honoured competitor.

#### **Program Notes**

Line 10 - Enables two independent screens of graphics to be used.

Line 20 - Sets amount of candles. Line 30 — Put computer into graphics.

Lines 40 & 50 - Draws circles. The format = circle (position x, position y), radius, colour, height to width ratio, starting point, ending point. Lines 70 & 80 — Draws line from point specified in the first bracket to point specified in the second bracket.

Lines 90 to 100 - Fills in cake with solid colour. The co-ordinates in the bracket specify where to start painting. The first number outside the bracket is the colour to be painted, and the second number is the colour at which painting must stop. (1=green, 2=yellow, 3=blue, 4=red). Lines 110 - 120 - Draw writing. It says 'Happy Birthday'.

Line 140 - Plays 'Happy Birthday To You'. Line 160 — Defines a mathematical equation. Lines 170 to 230 - For/Next loop which draws candles if P=0 and draws flames if P=1. P is changed at Line 240.

Line 240 - The completed screen (without flames) is copied to the second screen reserved in Line 10. P is set to 1, and the loop between 170 and 240 is run again to draw flames.

Line 250 - Return to Line 140 (Tune). Line 260 - The two graphic screens are flipped through in rapid succession. (Screen one has flames, whilst screen two does not.) This produces the flickering flames. The part of memory concerned with audio input is peeked, and depending on the result, a branch is taken to

an Inkey\$ statement if a similar effect is wanted but your tape recorder is not compatible. Line 270 - Screen two (without flames) is displayed to show candles blown out.

either Line 260 or 270. This could be replaced by

10 PCLEAR 8

20 Q=21

30 PMODE3,1:SCREEN1,0:PCLS1

40 CIRCLE(128,96),60,4,.3

50 CIRCLE(128, 128), 60, 4, .3, 0, .5

60 COLOR 4,1

70 LINE(68,96)-(68,128), PSET

80 LINE(188,96)-(188,128),PSET

90 PAINT(128,96),1,4

100 PAINT(128, 128), 2, 4

110 DRAW"BM16,4;C4;D16U8R8U8D16;BM30,20; 230 NEXT T U16R8D16U8L8;BM44,20;U16R8D8L8;BM58,20;U 240 IF P=1 THEN 250 ELSE IF P=0 THEN PCO R8D7L4D1L4R4D1R4D7L8;BM114,20;R8L4U16L4R 8;BM128,20;U16R8D8L8R2D2R2D2R2D2R2D2;BM1 250 RETURN 42,4;R8L4D16;BM156,4;D16U8R8U8D16"

2L6;BM186,20;U16R8D16U8L8;BM200,4;D8R8U8 2)=126 THEN 260 ELSE 270 D16L8"

130 GOSLIB 160

140 PLAY"02; T3L8CCL4DL4CFEP4L8CCL4DL4CGF

P4L8CC03L4C02AFEDL8B-B-L4AFGF"

150 GOTO 260

160 DEF FN R(X)=4.0\*ATN(1.0)

170 FOR T=1 TO Q

180 A=T/(Q/2)\*FN R(A)

190 X=128+50\*COS(A)

200 Y=96+15\*SIN(A)

210 IF P=0 THEN LINE(X, Y)-(X, Y-10), PSET

220 IF P=1 THEN CIRCLE(X, Y-10), 5, 2, 1.5:C

IRCLE(X, Y-10), 4, 2, .25

16R8D8L8;BM72,4;D8R8U8D16L8;BM100,20;U16 PY1 TO 5:PCOPY 2 TO 6:PCOPY 3 TO 7:PCOPY

4 TO 8:P=1:GOTO 170

260 PMODE3,1:SCREEN1,0:FOR X=1 TO 6:NEXT 120 DRAW"BM170,20;U16R6D2R2D2R2D8L2D2L2D :AUD100N:PMODE3,5:SCREEN1,0:IF PEEK(6531

270 PMODE3,5:SCREEN1,0

280 GOTO 280

#### HAPPY BIRTHDAY



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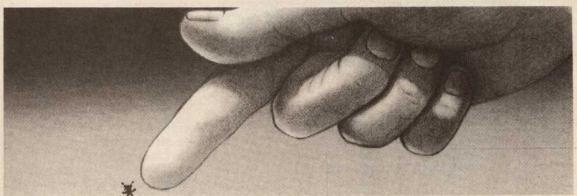
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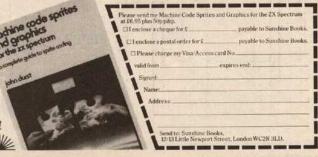
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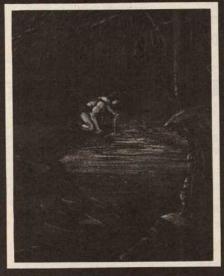
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# Reading beween the lines

Compress your graphics in memory by using these routines written by Andy Mitchell for the BBC B

dventure games with graphics are here to stay. This is a fact bemoaned by traditionalists who hate picture books but welcomed by many who want novelty. Love them or hate them, as a game writer you can't ignore them.

The problem for the Beeb is that you can't use a graphic mode with its convenient drawing routines without also losing massive chunks of precious memory to the screen map. The obvious solution is the use of Teletex graphics which gives reasonable results without additional memory loss. Of course, the next problem is the loss of drawing routines which means you must place every shape and colour character yourself. Various methods may be used to achieve this and as with all programming techniques the easiest to understand is not the best!

The simplest method involves drawing the required picture on squared paper and then transferring this information into a data list which is made up of the X and Y co-ordinates used by a Print Tab command for each shape and colour character followed by the character number used by the Chr\$ command. In Example 1 you can see that a simple routine to read each group of three numbers in the Data statement and use them in the Print Tab(X,Y) Chr\$(num) command will draw a small shape. This method, although simple, wastes a great deal of memory as each character printed requires three separate numbers stored to produce it. In addition by holding numbers in a *Data* statement we are wasting more space than if we held the numbers directly in memory.

To read the data and place it directly in memory Example 2 is used. This routine stores each of the numbers in successive memory locations beginning at location &3000. To retrieve the data and display it we use procedure Procdraw. Having stored the data in memory, Procstore and the Data statement may be discarded and only Procdraw and the section of memory from &3000 to &3011 need be saved for inclusion in our game. (The memory being saved using a \*Save"picture" 3000 3011 command).

This method has saved us some space. but it is still wasteful as we are still storing three numbers for each character. One method of overcoming this is to first draw our required picture on the screen using any method we like and then save the result to elsewhere in memory where we can process it further. The simplest way of achieving this is by using one of the many commercial teletext editor packages. By using such a package you can quickly draw your picture and save it to tape from where you can reload it to anywhere in memory using a \*Load command. Without an editor to assist you, you may still draw your picture using any other method you choose as this method will not form part of the final program. To copy your completed picture from screen to memory, you may use the procedure Procreloc in Example 3. This simple loop does a straight copy from the screen memory (&7C00 to &7FE8) to &3000 onwards. This procedure should be used immediately following your own drawing program so as not to corrupt the screen. Alternatively you may use the *Proctape* procedure (Example 4) to copy the screen to tape. The \*Opt1,0 command suppresses the tape counter display on the screen yet again to avoid corrupting your picture.

Having moved your complete picture into memory either directly or by saving to tape then reloading to &3000 we can now examine exactly what we've got. It is useful at this point to have the use of a memory display program such as found in many Toolkit programs. This however is not essential as we can write our own small version (see Example 5). As can be seen from examination of the memory we have now stored the contents of every location of the screen. We could copy this back directly by reversing the addresses in Procreloc and this is the method used by most commercial programs to put up a title page to keep us amused while the main program is loading.

However, it can be seen that large quantities of the data contains many successive locations holding the same characters (eq. &FF, &20 and &00).

We could save space easily by replacing these long lines of identical numbers by simply replacing them by one example of the character followed by the number required (eg, FF, FF, FF, FF becomes FF,

```
1 REM EXAMPLE 2
 10MODE 7
20 PRINT"DRAW OR STORE - D OR S ?"
30INPUT A$
40IF AS="D" PROCDRAW ELSE PROCSTORE
60DEFPROCSTORE
70 FOR Z% = 0 TO 17
80 READ X%
90 Z%?&3000 = X%
100 NEXT Z%
110 ENDPROC
120DEFPROCDRAW
130 CLS
140 START% = &3000
150 FOR Z% = 1 TO 6
160 X% = ?START% : Y% = START%?1
 CHAR% = START%?2
170 PRINTTAB(X%, Y%) CHR$(CHAR%)
180 START% = START% + 3
190 NEXT Z%
200 ENDPROC
210 DATA 9,10,145,10,10,255,11,10,255
220 DATA 9,11,149,10,11,255,11,11,255
```

```
10 DEFPROCRELOC
 20 FOR I% = 1 TO 999 STEP 4
 30 12:83000 = 12:87000
 40 NEXT TX
 50 ENDPROC
 1 REM EXAMPLE 4
 10 DEFPROCTAPE
 20 *OPT1,0
 30 *SAVE"SCREEN" 7C00 7FE8
 40 ENDPROC
 1 REM EXAMPLE 5
 10 MODE 7
 20 PRINT"INPUT START ADDRESS
 IN HEX e.9. &3000"
30 INPUT ADDS
 40 START% = EVAL( ADD# )
 50 PRINT" INPUT NUMBER OF LOCATIONS"
 60 INPUT NUM%
 70 FOR I%= 0 TO NUM%
 80 PRINT ~ 1%?START%; SPC(4);
  PRINT " START%+1%
 90 NEXT 1%
100 END
```

1 REM EXAMPLE 3

# BBC & Electron

04).

This processing is carried out by the Compress option of Example 6. By selecting Compress the program will begin at location &3000 and will process 1000 bytes (which is the size of a mode 7 screen) into locations &6000 onwards. On completion it will print the address of the final location

used and state the number of bytes saved. It is this section of memory from &6000 onwards which must be saved (ie, "Save-"New" 6000 ????) to be used in your final program with the Procback procedure in Example 6. Procback (Restore option) will decode the memory from &6000 onwards transering the data to the screen until it

builds up 1000 bytes.

Typically this method will save approximately one third of the space used by a normal screen dump but by amending Lines 70 and 290 in Example 6 to identify any other character in addition to &FF and &20 which you find you use, repeatedly much greater savings can be made.

1 REM EXAMPLE 6 10 REM EXAMPLE 6 201NOFF%=0:0UT0FF%=0:START=&3000:STORE=&6000 308%=0 40PRINT"COMPRESS OR RESTORE C OR R ?" : INPUT AS: IF AS="R" PROCBACK: END **50REPEAT** 60X%=START?INOFF% 701F XX=&FF OR XX=&20 OR XX=&00 PROCDUP ELSE PROCPACK 80INOFF%=INOFF%+1 90UNTIL INOFF%> 999 100CLS 110PRINTTAB(10,10)"FINAL LOCATION USED :~STORE+OUTOFF% 120PRINT"BYTES SAVED= ";1000-OUTOFF% 139FND 140DEFPROCDUP 150PROCPACK: Y%=X%: A%=INOFF%+1 160REPEAT 170XX=START?RX

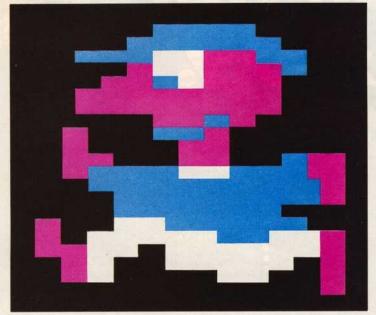
1808%=8%+1 190UNTIL XXX>YX 200XX=AX-INOFFX-1:INOFFX=AX-2 210IF XX>255 THEN AX=XX-255:XX=255:PROCPACK XX=YX: PROCPACK: XX=AX 220PROCPACK : ENDPROC 23@DEFPROCPACK:STORE?OUTOFF%=X%: OUTOFF%=OUTOFF%+1 : ENDPROC 240DEFPROCBACK 250CLS 260START%=&6000:SCREEN%=&7C00:A%=0 270REPEAT 280X%=START%?A% 290IF XX<>&FF AND XX<>&20 AND XX<>&00 PROCHAR ELSE A%=A%+1:Y%=START%?A%:FOR B% =1T0 Y%: PROCHAR: NEXT 300A%=A%+1 310UNTIL SCREEN%>%7FE8 320PRINTTAB(0,0)

330DEFPROCHAR : ?SCREEN%=X%

SCREEN%=SCREEN%+1 : ENDPROC



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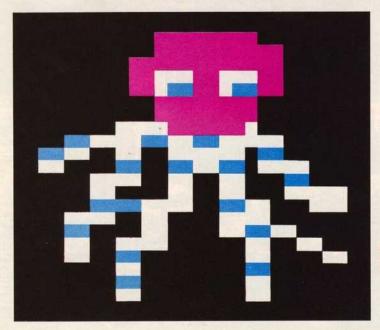
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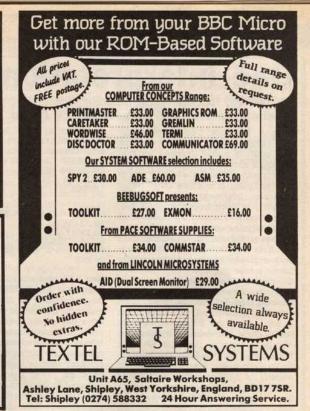
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# One interpretation

For budding machine code programmers, a Machine Code Interpreter for the CBM 64 by **Dominick Devlin** 

he Machine Code Interpreter (which is itself written in machine code) is mainly designed for programmers who are proficient in Basic and wish to start writing the whole or part of their programs in machine code. As an assembler, Interpreter is comparable in versatility to much longer assembly programs. It can also be used as a disassembler or monitor to inspect and edit machine code routines or character sets already inside the computer. In addition, it has other applications, such as helping to create sprites or to design screen displays.

Creating a simple program

Once a programmer has learnt, from the more sophisticated manuals, how machine code works, there is very little more he has to know about the Interpreter, because (unlike normal assemblers) it follows as closely as possible the rules of Basic. Nothing at all has to be learnt about editing, listing about editing, listing, recording and printing out machine code instructions as those instructions will be written as part of a Basic program. Inside that program, just before machine code begins, there will be a Basic command (SYS 36450)) which will call the Interpreter to take over until the program returns to Basic.

Here is a simple program, for printing out the alphabet. The machine code instructions are in Lines 10 to 60. Below the program is its rough equivalent in Basic. Of course, before the program is written the Interpreter program listed at the end of the article.

1 FOR CALL=1 TO 2:SYS3645Ø:CØØØ 1Ø \$ØØØØ ;ALPHABET PRINTER

```
2Ø $ØØØØ A2 "A"
3Ø $ØØØØ 6A:20 D2 FF
4Ø $ØØØØ E8
5Ø $ØØØØ C9 "Z": DØ (3Ø)
6Ø $ØØØØ 6Ø:END
1ØØ NEXT CALL
110 LIST
```

10 REM ALPHABET PRINTER

2Ø A\$="A"

3Ø PRINT A\$
4Ø A\$=CHR\$(ASC(A\$)+1)
5Ø IF A\$<>"Z" THEN 3Ø
60 END

Line 1 The instruction SYS 36450 calls the Interpreter. The FORNEXT instruction at the beginning of the line and in Line 100

makes the machine go through the routine

twice (not always necessary but safer). The SYS instruction must be immediately followed by the starting address of the machine code routine: the Interpreter does not itself execute machine code instructions, but stores them in the locations indicated by the Programmer. C000, at the end of Line 1, tells the Interpreter to put the machine code in the sequence of locations

beginning at \$C000 in hexadecimal numbe-

ring: 49152 in decimals. The command SYS

49152 will execute the instructions.

Line 10 Each new line of machine code instructions must start with a four-digit hex number — any number; the Interpreter needs the space on the line, mainly for its own purposes. The semicolon is the symbol for a rem statement.

Line 20 This means load the X register of the microprocessor (A2) with the ASC value of iA". A2 is the hexadecimal code for the instruction LDX: in order to keep it short, I

have not taught the Interpreter to understand source code (LDX, STA etc.).

The Interpreter treats inverted commas in the same way as Basic does. It takes the ASC values of all characters following them until it meets other inverted commas or the end of a line. But if after the first inverted commas it finds the symbol #, it takes the screen values (e.g., A = 1) and not the ASC values (A=65). This facility works with all screen characters except reverse characters, the letter  $\pi$ , and the symbol # itself. Line 30 copies the X register on to the Accumulator (8A), which is then sent off to the CBM 64's CHROUT subroutine for printing out (20 D2 FF). These two instructions have been put on the same line and separated by a colon for convenience only; the Interpreter ignores colons and spaces (outside inverted commas).

Line 40 increases the X register by one. Line 50 compares the Accumulator (C9) with "Z"; if it is not equal (D0), Processing goes back to Line 30. The line number in brackets can be used with any instruction (e.g. 4C (30) = jump to Line 30). Using line numbers is not mandatory but makes life much easier when you come to edit or debugs a program, or to transfer it from one set of locations to another.

Line 60 The code 60 is the instruction for a return from a machine code routine or subroutine. END marks the end of all instructions in machine code. From that point the Basic interpreter takes over again.

Run the program, and this is what will appear:

```
1 FOR CALL=1 TO 2:SYS3645@:CØØØ
10 $ØØCØ ;ALPHABET PRINTER
2Ø $ØØCØ A2 "A"
3Ø $Ø2CØ 8A:2Ø D2 FF
4Ø $Ø6CØ E8
50 $ØTCØ C9 "Z":DØ (3Ø)
6Ø $ØBCØ 6Ø:END
10Ø NEXT CALL
```

```
1 REM MESSAGE
2 GOSUB100:GOSUB100:LIST
3 $FBFC POINTERS TO SCREEN (0400) & COLOUR (D800) MEMORIES
4 $FDFE POINTERS TO MESSAGE (IN LINES 300 AND 310)
100 SYS36450: C000
110 $0000
          18:80 07
                             CLC:LDY #07
           ; ..... PREPARE POINTERS
120 $0300
130 $0300
         A2 03
                             ;LDX #03
          B9 (320):95 (3 L);LDA $C06B,Y:STA $FB,X
150 $0500
160 $0AC0
           88:CR:10 (150)
                            ; DEY: DEX: BPL $C005
           ; ..... SWITCH SCREEN WITH MESSAGE
180 $0EC0
           RØ 22
200 $0EC0
                            ; LDY #$22
210 $1000
           B1 (4 L):48
                             ;LDA ($FD),Y:PHA
220 $1300
         B1 (3 L):91 (4 L); LDR ($FB), Y:STR ($FD), Y
           68:91 (3 L)
                            ;PLA:STA ($FB),Y
230 $1700
           88:10 (210)
                            ; DEY: BPL $C010
240 $1AC0
            ..... IF CARRY CLEAR, REPERT
250 $1DC0
                            BCC 01:RTS
260 $1DC0
           90 01:60
           38:80 03:80 (120); SEC:LDY #03:8CS $0003
270 $2000
           "##申申申THIS IS YOUR LAST CHANCE! ##申申申"; TEXT
300 $2500
           "#@@@@NNNNNNNNNNNNAAAAAAAAAAAA@@@@";COLOURS
310 $4800
320 $6BC0
           00 04 (300) 00 D8 (310); I.E. 00 04 25 C0 00 D8 48 C0
330 $7300
           END: RETURN
```

# Commodore 64

You will see that the address of the next location to be filled has been marked at the beginning of each line. \$00C0, instead of \$C000, may seem rather odd, but the Interpreter prefers to see the addresses in that order, and it will be referring to them much more than the programmer.

You now have a machine code routine stored in locations \$C000 to C00B. Type SYS 49152, Return; and it will be executed.

Other applications

Basically, the Interpreter pokes data — in the form of hex codes, CHR\$ characters or screen characters — into a sequence of locations, whose starting address is specified by the user. If, instead of C000 (see Line 1 above), you choose 0340 (832 in decimals) as your starting point, you will be directly storing the data for Sprite 13:

1 SYS 3645Ø:Ø34Ø ;sprite 13 1Ø \$ØØØØ ØØØØØØ ;line 1 2Ø \$ØØØØ 1FFFFs ;line 2

21Ø \$ØØØØ ØØØØØØ ;last line 22Ø \$ØØØØ END

Sprite data can be written quite easily in hexadecimals: the first and last lines of the sprite just programmed are completely blank. A program can contain several different versions of the same sprite, using only one sprite location.

With the *Interpreter*, characters can be directly poked into screen memory (starting at \$0400), and their colours into colour memory (starting at \$d800):

1000 SYS 36450:0400 ;characters 1010 \$0000 "#+-" END 2000 SYS 36450: d800 ;colours 2010 \$0000 "#@A" END

This program will put a black plus and a white minus at the top left corner of the screen. to programme the colours, Line 1010 was entered; then its number was increased by a thousand, and @ was placed on top of +, and A on -. The screen code for @ is 0, which is also the colour code for black; A = 1 = white, etc. To fill the whole screen, to program the colours, Line each, followed by 25 lines of corresponding colour codes.

### Advanced programming

For programmers who are familiar with the 6510 machine code, more needs to be said about the indirect references to line numbers. As an illustration, Message is a program that creates a routine which, when called once, displays a message on the screen; when called again, it redisplays what was on the screen before, underneath the message.

When it finds a number in brackets, the Interpreter goes to the line indicated and takes the two bytes in its address: low order, high order. In Line 150, B9 (320) becomes B9 6B C0; but 95 (3 L) becomes 95 FB — in other words, only the low order byte in the Line three address has been taken. With 95 (3 H) the high order byte only (FC) would have been taken.

Lines three and four have been placed

outside the machine code part of the program so that their addresses remain unchanged. Not only can the routine be placed anywhere just by altering the address in Line 100, but different pointers can be used simply by changing the addresses in Lines three and four.

An error (undetected) by the Interpreter) will occur if a branch instruction exceeds the permitted limit (127 bytes). There is a slight risk in using line numbers without any opcode before them, as in Line 320. If, for example, they had been preceded by D0, the Interpreter would have treated them as branch instructions.

If you received an error message like "syntax error in Line 240", the error might not be in that line, but in Line 210, to which Line 240 refers.

Note that End has been placed on a separate line (330); it would have been ignored in Line 320 because of the Rem statement there.

### Disassembly

If you want to inspect the contents of any byte in your program, replace the corresponding code with Q, and run the program again. If you wish to incorporate, in your own program, routines that are already in the machine, put a Q. for each byte to be incorporated. Normally, the Interpreter takes each code, translates it (if necessary) and stores it in the next location. When it meets Q, it does the opposite: it takes the byte in the next location, translates it into hex and puts it inside the user's program on top of the Q. For example, in order to reshape the alphabet program on to one line, write:

After RUN, this will be the listing: 1Ø SYS3645Ø:CØØØ A2 41 8A 2Ø D2 FF E8 C9 5A DØ F7 60 END:LIST

If for example, you wish to edit a whole character set, you will need an awful number of lines with Qs in them. You could generate the lines by means of a program which might include the following line to fill the keyboard buffer (starting address: \$02T7):

SYS 3645Ø:Ø277 "[home]" ØD ØD "RUN" ØD END:POKE 198,7

```
10 REM *** INTERPRETER ***
20 FOR P=36450 TO 36859
30 READ D:POKE P.D:NEXT:END
160 DATA 162, 2, 32, 56, 143, 144, 1, 96, 149, 252
170 DATA 202, 208, 245, 32, 56, 143, 176, 6, 32, 98
180 DATA 143, 76, 111, 142, 208, 30, 160, 4, 162, 2
    DATA 177, 122, 149, 56, 136, 202, 208, 248, 162, DATA 160, 5, 181, 127, 32, 113, 143, 232, 16, 248 DATA 32, 139, 143, 76, 111, 142, 201, 40, 240, 83
190
200
210
228
    DATA 201, 59, 24, 240, 11, 201, 128, 208, 3, 76
     DATA 115, 0, 201, 34, 208, 47, 160, 0, 132, 96
230
240
     DATA 200, 177, 122, 208, 6, 32, 139, 143, 76, 124
DATA 142, 144, 243, 201, 34, 240, 209, 201, 35, 208
250
260
     DATA 4, 198, 96, 208, 231, 36, 96, 240, 7, 9
270
     DATA 64, 56, 233, 64, 48, 251, 32, 98, 143, 56
288
     DATA 76, 178, 142, 201, 81, 240, 1, 96, 160, 255
           162, 0, 161, 253, 32, 113, 143, 32, 102, 143
76, 148, 142, 32, 150, 143, 165, 123, 72, 165
290
300
           122, 72, 165, 251, 133, 122, 165, 252, 133, 123
310
     DATA
     DATA 169, 4, 32, 140, 143, 32, 56, 143, 176, 82
320
330
     DATA 166, 95,
                      224, 16, 208, 11, 229, 253, 56, 233
              32, 98, 143, 76, 47, 143, 166, 92, 224
340
     DATA 1,
     DATA 30, 208, 5, 32, 56, 143, 176, 54, 32, 98
350
           143, 230, 92, 240, 244, 104, 133, 122, 104, 133
360
     DATA
           123, 76, 111, 142, 32, 74, 143, 10, 10, 10
370
380 DATA 10, 133, 96, 32, 74, 143, 41, 15, 24, 101
390 DATA 96, 96, 32, 115, 0, 168, 144, 17, 233, 55
    DATA 201, 4, 240, 8, 201, 9, 144, 240, 201, 16
DATA 144, 3, 104, 104, 152, 96, 162, 0, 129, 253
400
410
     DATA 230, 253, 208, 2, 230, 254, 41, 31, 133, 95
420
    DATA 96, 56, 32, 117, 143, 72, 144, 4, 74, 74
430
440 DATA 74,
                74, 41, 15, 201, 10, 144, 2, 105, 6
450
     DATA 105, 48, 200, 145, 122, 104, 96, 152, 24,
           122, 133, 122, 144, 2, 230, 123, 96, 162, 2
460
     DATA
           181, 42, 149, 250, 202, 208, 249, 134, 93, 134
470
     DATA
480 DATA 94, 32, 115, 0, 176, 43, 41, 15, 72, 24
                93, 38, 94, 165, 93, 166, 94, 38, 93
    DATA 38, 94, 38, 93, 38, 94, 24, 101, 93, 133
DATA 93, 138, 101, 94, 133, 94, 104, 24, 101, 93
DATA 133, 93, 144, 2, 230, 94, 76, 163, 143, 233
500 DATA
510
520
     DATA 42, 133, 92, 48, 3, 32, 115, 0, 162,
530
    DATA 160, 3, 177, 251, 213, 92, 208, 5, 136, 202
540
550 DATA 208, 246, 96, 160, 0, 177, 251, 170, 200, 177
560 DATA 251, 133, 252, 134, 251, 208, 227, 104, 104,
```

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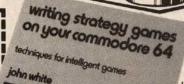
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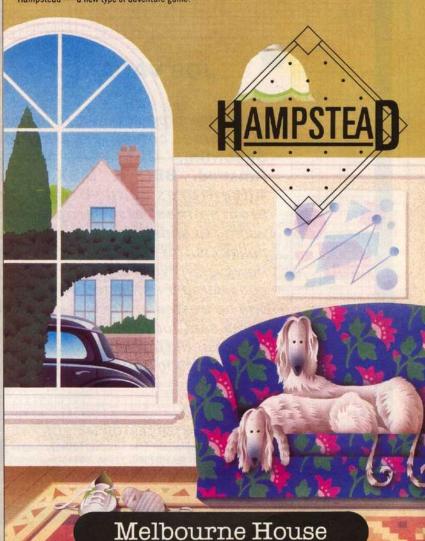
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# INTERCEPTOR INTERCEPTOR INTERCEPTOR INTERCEPTOR INTERCEPTOR

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### **Shopping List**

### on Vic20

Shopping List
Shopping List is a one line utility for the
person who doesn't want to have to rush
around with tatty bits of paper. However,

they must own a Vic20 and a Printer. The program can take up to 20 items, although this can be increased by changing the appropriate '20's. To type in the program, use the shorthand as described in the back of the Vic manual.

Program Notes Line 1: The works.

```
ITEM NO. 1 APPLES
           SPADE
ITEM NO.
ITEM NO.
           CHI
ITEM NO.
          YOGHURT
ITEM NO. 5 DOLLY MIXTURE
ITEM NO. 6 TOILET ROLLS
           THREE PIECE SUITE
ITEM NO.
ITEM NO.
           TURKET
ITEM NO.
         9 COMPUTER
         10 VIDEO RECORDER
ITEM NO.
         11 MONOPOLY
ITEM NO.
            TRUMPET
ITEM NO.
         12
         13 POPULAR COMPUTING WEEKLY
ITEM NO.
         14 MOWER (CONCORDE OR FLYMO?)
ITEM NO.
ITEM NO.
         15 JOYSTICK
ITEM NO. 16 84.5P STAMP
            THE OMEGA RUN
ITEM NO.
         17
TTEM NO. 18 ASPIRINS
ITEM NO.
         19
            ? ORIC (GET THE JOKE)?
```

SHOPPING LIST

Shopping List by M Valentine

1 DIMA\$(20):FORT=1T020:INPUTA\$(T):NEXT:OPEN1,4:FORT=1T020:PRINT#1,"ITEM NO."T;A\$ (T):NEXT:CLOSE1

# Microradio

ITEM NO. 20 WAR & PEACE

# GW6JJN

### Terminal kit

s promised last week, I will tell you how to come by a reasonably chap Radio Teletype (RTTY) interface/terminal unit.

For Spectrum owners, a project is available from the Sinclair Amateur Radio Users Group (SARUG). It consists of a printed circuit board and extensive instructions regarding the construction of the unit. Also available from SARUG is the computer program needed to drive the unit. This project is about the least expensive around and I am in the process of making it myself. In fact it is just about complete and all that remains is to test it on air. SARUG can be contacted by sending a stamped addressed envelope to SA-RUG, 3 Red House Lane, Leiston, Suffolk.

For any other kind of computer as well as Sinclair, there is good news from the component suppliers Maplin of PO Box 3, Rayleigh, Essex SS6 8LR.

Maplin have just announced the kit for their TU1000 terminal unit designed specifically for RTTY on home computers. The kit of parts is available from them priced £49.95. It consists of all the components needed to build the unit, the only extras required being a box to put it in and the 13amp plug. These items are available from Maplin, as are many other kits and components, including their Modem for those of you who prefer to pay telephone bills.

The TU1000 is capable of several different selectable baud rates which will enable data to be received from either amateur or commercial sources. Input to the unit from the computer is via an RS232 type port so will appeal to many computer owners who have this facility.

In their published information about the unit, Maplin have provided a program based on the Atari computer but supply plenty of details on adapting it to any computer.

Interestingly, they mention something of the history of RTTY and the fact that it dates back to the beginning of the 20th century to Donald Murray who modified the original five unit code system invented by Emile Baudot in 1874. They mention also that the earliest recorded use of RTTY was in the Russian-Japanese war as far back as 1904. Scrambling methods were used by military and commercial authorities in those days as well as now. Even with your home computer rigged up to the radio you won't be able to understand sensitive information because it will be scrambled or encoded. Have no fear, though, there is plenty of data around in plain language, and most of it is in English which is now considered the international communications language.

What is significant about a large company like Maplin marketing a terminal unit kit, is that it acknowledges the growing amount of people who want to do something more with their computer than play games. RTTY is certainly the cheapest way to do this and to really interface yourself into the wide world.

Ray Berry

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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### Circle

### on Amstrad

The Amstrad, though having some very nice graphics commands, lacks a *Circle* command. These general subroutines provide such a facility in a flexible manner.

The first routine draws a circle in outline and the second a solid circle. The routines work by using the familiar parametric equation of a circle. This however gives an ellipse due to the CRT in the monitor. The vertical co-ords have been adjusted to give a circle in these routines.

An attempt has also been made to speed

them up by only calculating the sines and cosines of 0-90 degrees and making use of the symmetry of the circle.

The parameters to be set before calling the routines are:

radius: radius of circle cx,cy: x and y co-ords of circle usepen: pen to be used

```
20 MODE 1
30 LOCATE 10,1:PRINT CHR$(24);
"SUBROUTINE DEMO"; CHR$(24)
40 PRINT: INPUT "Radius "; radius
50 PRINT: INPUT "X, Y co-ordinates
of centre ";cx,cy
60 PRINT: INPUT"Outline or
solid (o/s) ";type$
62 PRINT: INPUT "Pen to be used "; usepen
65 CLS
70 IF tupes="s" THEN GOSUB 1500
ELSE GOSUB 1000
72 LOCATE 1,1:PRINT"Press any key";
75 IF INKEY$="" THEN GOTO 75
80 RUN
900 END
999 REM ******************
1000 REM circle
1005 REM ****************
1010 DEG
1015 anglestep=1/INT((radius+100)/110)
1020 FOR i=0 TO 90 STEP anglestep
```

U.5*CO	S(i)/8
1040	PLOT cx+xdis,cy+ydis,usepen
1050	PLOT cx-xdis,cy-ydis,usepen
1060	PLOT cx-xdis,cy+ydis,usepen
1070	PLOT cx+xdis,cy-ydis,usepen
1080	NEXT i
1090	RETURN
1490	REM ***************
1500	REM fill circle
1505	REM ***************
1510	DEG
1515	anglestep=1/INT((radius+100)/100)
1520	FOR 1=0 TO 90 STEP anglestep
1530	xdis=radius*SIN(i):
ydis=	7*radius*COS(i)/8
1540	PLOT cx+xdis,cy+ydis,usepen
1550	DRAWR -(xdis#2),0,usepen
1560	PLOT cx-xdis,cy-ydis,usepen
1570	DRAWR xdis#2,0,usepen
1580	NEXT i
1590	RETURN

Circle by S Sinc

# Arcade Avenue

1030 xdis=radius\*SIN(i):ydis=7\*radi



### Hackers treat

et Set Willy is still riding high in the Spectrum charts despite stiff competition. However, from the letters that I get, I'm beginning to think that no-one is buying it to play anymore, you all just want to hack the code around. First of all, this week, I would like to thank Paul Denman of Bradford, Graeme Carrot of Newcastle and James Meeman of Enfield for your Pokes and programs. Unfortunately most of these have been published before, perhaps since you posted your letters. However, there have also been a few requests for me to reprint all the various JSW pokes and listings we have had. In a few weeks time I may well sit down and collect together all the various bits and pieces and publish them as the definitive word on the subject. So you may yet see your work in print.

One idea that I will consider is the "official PCW Jet Set Willy pokes" as a standard that we will encourage people to use before playing the game.

In the meantime, I have a treat for all you hackers who really want to get to work pulling the program to pieces, in the form of a long letter from Ben Caunce of Hixon, near Stafford, "Having played ISW for many weeks I think I can safely say that it is the most enjoyable game that I and my children have ever played on the Spectrum. Although I have never written a machine code program in my life I decided to 'have a go' and discover what made the game tick. The result of this madness was several weeks of late or sleepless nights and dreams containing nothing but Z80 mnemonics.

"By studying the disssembled listing of the code I discovered how, and where, the information for each room is coded. Each room is contained in only 256 bytes, the first 128 of which relate to the room's appearance. Each room consists of 16 lines by 32 columns and each byte of information in the first 128 bytes represents an area of screen 1 line high by 4 columns wide — starting from the top left. During the game the information for the room you are in is transferred to a location starting at 8000 hex and ending at 80FF (ie, 256 bytes).

"For each room the information for which rooms can be reached from it are stored in locations xxE9 (room to left): xxEA (room to right); xxEB (room upwards); and xxEC (room downwards). When Willy leaves a room to enter another the number stored in the relevant byte (xxE9-xxEC) is OR'ed (added) to CO to give the high order address of the room information for the new room. (For example, the number stored at location COE9, to the left of the Off Licence, is 01. Added to CO this gives C1. C100 is the start address of the

room information for T Bridge). Also the informati stored in locations xxFO xxFF for each room appears relate to the monsters a 1 ropes since if these bytes a repoked with 0 then the monsters disappear!"

This information should be particularly useful since gives you the option of selectively removing from a room a monster that you find particularly difficult.

Finally for this week I wo like to finish with a bit of from Charlie Broker Brightwell in Oxon who gi us Poke 38488,0 which m Willy walk backward 'sdrawcab' as he calls it.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or biame!) then write to: Tony Kendle, Arcade Avenue, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3 LD.

### Typing practice

on Vic 20

This utility enables the user to see how good

his/her typing is. It is also good exercise in using TIS.

The program asks you for a sentence which you are to type. On pressing Return, the clock starts, and you must type in the given sentence in as short a time as possible. The computer tells you if you

You are then given the opportunity to change the sentence. Useful for budding touch-typists on the unexpanded Vic20.

5 POKE36879,59

10 INPUT"WHAT SENTENCE?"; S\$

20 TI\$="000000":PRINT""

30 INPUTT\$

40 IFT\$<>S\$THEN90

50 PRINT"WELL DONE! YOU DID IT IN "

60 PRINTTI/100; "SECONDS"

70 GOTO100

90 PRINT"WRONG"

100 PRINT"SAME SENTENCE(Y/N)

110 GETA\$: IF A\$=""THEN110

120 IFA\$="Y"THEN20

130 GOTO10

READY.

Typing practice by H Dunn

# The Music Box

which of the following statements is the truest — a) computer music is a lot of tuneless plinks and bangs or b) computer music is too expensive for me?

The answer is neither is still the case. So now is a good time to begin a new weekly micro masic column — The Music

hose of you who dismissed the test with an unmannerly interprobably already a thing or two about the kept up to date, you could do worse than read on.

Computer music — like robotics, A1 and adventure gaming — is one of the current growth areas for the home computer owner.

We're not talking about sound effects for games, nor about spending thousands of pounds on your own home studio. And while we may still be some way from the day when pop groups will tote micros like they used to tote guitars, that day is really not too far off. The field is developing so quickly that the first hit record produced entirely on a home micro will no doubt be with us before long.

Already, lucky Commodore 64 owners can buy a floppydisc-full of popular melodies, giving 40 minutes of baroque music, out-of-copyright American popular songs or Christmas carols when used with a piece of software called Synthy-64 (produced by Abacus Software of Grand Rapids, Michigan and available over here from Adamsoft, 18 Norwich Avenue, Rochdale, Lancs OL11 5JZ). Programs that play music or help you compose it are becoming widely available.

And anyone who's been lucky enough to get their hands on Yamaha's new MSX machine — the CX5M — will know that the musical potential of the micro has, as yet, barely been tapped.

Computers and music have had a long and fruitful relationship, going back at least as far as the late forties and pioneering work at the RCA and Bell Telephone labs in the US. Latterly, the names of Rabbitt, Cage and Stockhausen have been joined by the likes of Thomas Dolby, Brian Eno and even Kate Bush.

The micro can be used in a variety of ways to produce music — for example, through direct synthesis, the use of programmable sound generators or through the synthesiser manufacturer's standard inferface — the Musical Instrument Digital Interface (MIDI) stan-

dard — which allows you to control together synths, drum machines and the like.

We'll be dealing with these things in future weeks as well as bringing you news, views and suggestions for micro music making. If you've got any tips, news, problems or products, please write to me at Popular Computing Weekly and I'll make sure this column works for you.

Gary Herman

The Music Box is a new weekly column with news, reviews and readers comments on all aspects of micros and music.

Any readers with experience of computer music making or companies with new product news are invited to write to: drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street, London WC2R 3LD.

### **Function**

on Spectrum

This program (written for 48K Spectrum) will draw the graph of a mathematical function v=f(x) on a calibrated set of axes on screen, which can then be output to a ZX Here are some interesting functions to try:

It can draw the graph of any function that  $y=(2)/(1-x^*x)$ can be written in Spectrum Basic, and there  $y=(3(x^*x))-7$ is no limit to which part of the x,y axes the

graph is drawn over.

y=(1=x)/(1+x\*x)y=((x\*x)\*(4+x))/(2-x)

```
JACH O INK Ø: PAPER 7: BORDER 7
12 OVER Ø: FLASH Ø: CLS
14 LET as=""
20 PRINT AT 18,0;"Do you want
) see the "
25 PRINT "instructions on how over the "
25 PRINT "instructions on how over the "
25 PRINT "instructions on how over "
     to
                           PRINT "this program ?"
INPUT "Enter (y)es or (n)o
   35 INPUT "Enter (yes or (n)o
")a$

40 IF a$="" THEN GO TO 35

45 IF a$(1)="y" THEN GO 5UB 20

00: GO TO 100

S0 IF a$(1)="n" THEN GD TO 100

50 IF a$(1)="n" THEN GD TO 100

100 INPUT "Lower limit for x-ax
is ";x1

105 INPUT "Upper limit for x-ax
is ";x2
 105 INPUT "Upper limit for x-ax is"; X2 THEN GO TO 140 120 PRINT PLEASE PAUSE 100 130 PLASH 1; "LOW EST FIRST PLEASE PAUSE 100 130 PLASH 0; CD TO 100 140 IF as "X" THEN GO TO 200 150 INPUT "Lower limit for y-ax is 5; Y2 155; Y2 THEN GO TO 200 156 PRINT "Upper limit for y-ax is 155; Y2 THEN GO TO 200 156 PRINT 100; FLASH 1; "LOW EST FIRST PLEASE PAUSE 100 175 PLASH 0; CLS GO TO 150 170 REH # WORK OUT the ratio # 190 REH # WORK OUT the ratio #
         190
191
192
193
                             REM * work out the ratio
REM * between pixels and
REM * units on axes
REM
                            REM
LET rx=(x2-x1)/255
IF a$="x" THEN GO TO 215
LET ry=(y2-y1)/175
REM
REM * draw axes *
GO SUB 1000
REM
REM * draw the function
REM * draw the function
          200
        224 OVER 0
225 FOR X=X1 TO X2 STEP TX
300 LET y=SIN X
310 LET xc=(x-x1)/rx
315 LET yc=(y-y1)/ry
326 IF xc(0 OR xc>255 OR yc(0 O
R yc)175 THEN GO TO 330
325 PLOT xc,yc
335 INPUT "Do you want a hard C
OPY ";a$
337 INPUT "Do you want a hard C
OPY ";a$
337 IP a$="" THEN GO TO 335
340 IF a$(1)="y" THEN COPY : GO
TO 350
345 IF a$(1)<"D" THEN CO TO 35
         222
                             REM
OVER Ø
        TO 350
345 IF as(1) (>"n" THEN GO TO 33
      350 INPUT "do you want to re-dr
w the graph ":a$
955 IF a$="" THEN GO TO 350
360 IF a$$(1)="n" THEN GO TO 900
365 IF a$$(1)="y" THEN GO TO 405
370 GO TO 350
405 PRINT AT 18,0; "Do you want
o change either"
410 PRINT "limits of x or y axe
 $ ?"
415 PRINT "Enter: "
420 PRINT "<X>, <y>, <b>oth ,
(n)either"
425 INPUT "x,y,b or n ";a$
430 IF a$=" THEN GO TO 425
435 IF a$=" THEN GO TO 425
435 IF a$ (1) = "x" OR a$ (1) = "b" T
HEN GO TO 100
440 IF a$ (1) = "y" THEN GO TO 150
445 IF a$ = "n" THEN GO TO 215
430 STOPO 420
                           STOP
```

```
995
996
997
              REM
                          998
              REM
999 REM
1000 CLS
1002 OVER 1
1003 IF y1)0 OR y2<0 THEN GO T
0 1050
1005 PLOT 0, -y1/ry
1010 DRAW 255,0
1015 IF x2-x1)100 THEN GO TO 104
PRINT TAB (8); "INSTRUCTIONS
 2010 PRINT TAB (8);"-----
 2015
             PRINT TAB (5); "To set a fun
 ction
2025
              PRINT TAB (5); "rewrite line
  2030 PRINT "
 2055 PRINT: PRINT "Manipulating these figures,"
2060 PRINT "you can zoom in on a my part"
2065 PRINT "of the graph."
2070 PRINT AT 21,12;"...press an y key.
2075 PAUSE 10: PAUSE 0
2080 CLS: PRINT "The computer with the of draw"
 2085 PAINT
en draw"
2090 PRINT "the function. You ca
n then get"
2095 PRINT "a COPY of the graph
sent to a "
2095 PRINT "a CUPT OF THE SENT to a "2100 PRINT "Sinclair ZX Printer by entering" 2105 PRINT " (y) es when asked." 2112 PRINT " (PRINT "You can opt to redraw the graph" 2115 PRINT "(with different limits on axes)." (with different limits on axes)." PRINT " BUT NOW ... if you want to" 2120 PRINT "put in another function."
 ion,"
2130 PRINT "press (SHIFT SPACE)
to BREAK,"
2132 PRINT "rewrite line 300 and
run again."
2135 PRINT "PRINT
2140 PRINT "Otherwise ... to inp
ut the
 ut the "Ut the "Limits on axes..."
2145 PRINT "Limits on axes..."
2150 PRINT AT 21,12;"...press an
 2150 PHINT HT 21,12;".

9 Key...

2155 PAUSE 10: PAUSE 0

2200 RETURN
```

Function by Michael Poyner

### Scroll protect

### on Dragon

Here is a useful routine for the Dragon owner. By interupting the Dragon's *Print* routine before the screen is scrolled it is possible to protect upto eight lines. As presented the program is set up to protect four lines. When the screen is scrolled the top four lines will remain on screen and only the bottom 12 lines will be scrolled. The number of lines protected can be altered by Pokeing the desired number to address &HTFD2. This routine might prove useful when writing adventure games or similar to prevent the room description from scrolling

off the screen.

The routine can be entered using an assembler or *Poked* into memory using the memory dump. If the latter course is taken then also *Poke360*,&HTF, *Poke361*,&HBD: *Poke359*,&HTE to enable the routine *Poke369*, 57 to disable it. The routine can be saved to take by *CSavem*"code",&HTFD,&HTFFF,359, *CSavem*"vector", 359,361,359.

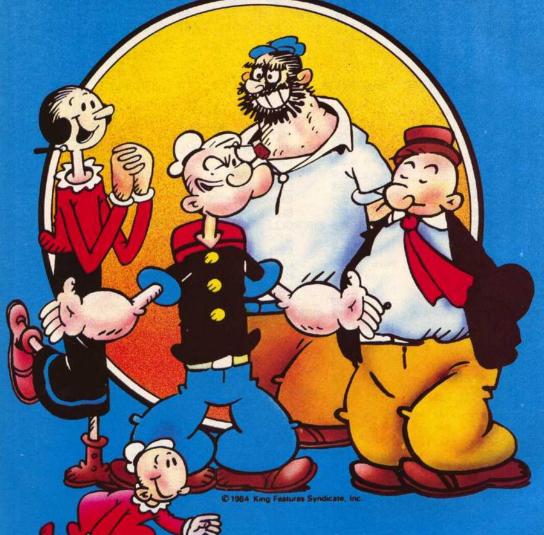
MEWC	DRY	DU	MP F	FOR	ROL	JTI	HE				
32701 32712	52	23 37	129 38	13	39	49	190	0	136 136	140	5 4
32723		32	61	48 195	136	32	31	1	166	128	167
32734 32745	100 AT 1 TO	223	140 128	6 140	0	37 Ø	246	134	96 53	142	5 57
32756		0	136	140	5	223	37	245	32	205	255

### ASSEMBLER SCROLL PROTECT ROUTINE

7FBD 3417 20 @START PSHS X,D,CC 7FBF 810D 20 CMPA #13 7FC1 2731 20 BEQ @LF 7FC3 8E0088 20 LDX \$88 7FC6 8C05FF 20 CMPX #1535 7FC9 2526 20 BLO @RETURN 7FCB 3088E0 20 ESCROLL LEAX -32,X 7FCE BF0088 20 STX \$88 7FD1 8604 20 LDB #32 7FD5 3D 20 MUL 7FD6 C30420 20 LDB #32 7FD5 3D 20 MUL 7FD6 C30420 20 ADDD #1056 7FD9 1F01 20 TFR D,X 7FCB 8C0600 30 CMPX #1536 7FC3 25F6 30 BLO @LOOP1 LDA ,X+ 7FD A788DF 30 STA -33,X 7FE0 8C0600 30 CMPX #1536 7FC5 8C60 30 LDA #96 7FC7 8E05E0 30 LDA #96 7FC7 8E05E0 30 LDA #1504 30 PCD STA ,X+ 7FCC 8C0600 30 CMPX #1536 7FC7 8C05DF 30 RTS 7FFC 35F7 8C05DF 30 RTS 7FFC 8C05DF 30 CMPX #1503 7FFC 20CD 30 BRA @SCROLL 0167 40 ORG 359	
7FBF 810D         20         CMPA #13           7FC1 2731         20         BEQ @LF           7FC3 BE0088         20         LDX \$88           7FC6 8005FF         20         CMPX #1535           7FC9 2526         20         BLO @RETURN           7FCB 3088E0         20         @SCROLL LEAX -32,X           7FCE BF0088         20         STX \$88           7FD1 8604         20         LDA #4           7FD3 C620         20         LDB #32           7FD5 3D         20         MUL           7FD6 C30420         20         ADDD #1056           7FD9 1F01         20         TFR D,X           7FD8 A680         30         @L00P1 LDA ,X+           7FD0 A788DF         30         BLO @L00P1           7FD8 8660         30         STA -33,X           7FE0 8C0600         30         CMPX #1536           7FE7 8E05E0         30         LDA #96           7FE7 8E05E0         30         LDA #96           7FE7 8C0600         30         CMPX #1504           7FE7 3517         30         QRETURN PULS D,X,C           7FF3 39         30         RTS           7FF4 BE0088         30         QLF L	
7FC1 2731         20         BEQ @LF           7FC3 BE0088         20         LDX \$88           7FC6 8C05FF         20         CMPX #1535           7FC9 2526         20         BLO @RETURN           7FCB 3088E0         20         @SCROLL LEAX -32,X           7FCE BF0088         20         STX \$88           7FD1 8604         20         LDA #4           7FD3 C620         20         LDB #32           7FD5 3D         20         MUL           7FD6 C30420         20         ADDD #1056           7FD9 1F01         20         TFR D,X           7FD8 A680         30         @LOOP1 LDA ,X+           7FD8 A780F         30         STA -33,X           7FE0 8C0600         30         CMPX #1536           7FE3 25F6         30         BLO @LOOP1           7FE5 8C60         30         LDA #96           7FE7 8C0500         30         CMPX #1536           7FE7 8C0600         30         CMPX #1536           7FE7 8C050F         30         RTS           7FF7 8C050F         30         BLO @RETURN           7FF7 8C0CD         30         BRA @SCROLL	CC
7FC3 BE0088         20         LDX \$88           7FC6 8C05FF         20         CMPX #1535           7FC9 2526         20         BLO @RETURN           7FCB 3088E0         20         @SCROLL LEAX -32,X           7FCE BF0088         20         STX \$88           7FD1 8604         20         LDA #4           7FD3 C620         20         LDB #32           7FD5 3D         20         MUL           7FD6 C30420         20         ADDD #1056           7FD9 1F01         20         TFR D,X           7FD8 A680         30         @LOOP1 LDA ,X+           7FD0 A788DF         30         STA -33,X           7FE0 8C0600         30         CMPX #1536           7FE3 25F6         30         BLO @LOOP1           7FE5 8E05E0         30         LDA #96           7FE7 8E05E0         30         LDA #1504           7FEC 8C0600         30         CMPX #1536           7FEF 25F9         30         BLO @LOOP2           7FF1 3517         30         @RETURN PULS D,X,C           7FF3 39         30         RTS           7FF4 BE0088         30         @LF LDX \$88           7FF7 8C05DF         30	
7FC6         8CØ5FF         20         CMPX         #1535           7FC9         2526         20         BLO @RETURN           7FCB         3Ø88EØ         20         @SCROLL LEAX -32,X           7FCE         BFØØ88         20         STX #88           7FD1         86Ø4         20         LDA #4           7FD3         C62Ø         20         LDB #32           7FD5         3D         20         MUL           7FD6         C3Ø42Ø         20         ADDD #1056           7FD9         1FØ1         20         TFR D,X           7FD8         A68Ø         30         @LOOP1 LDA ,X+           7FD8         A68Ø         30         ELOOP1 LDA ,X+           7FD9         1FØ1         30         BLOOP1 LDA ,X+           7FD8         A68Ø         30         CMPX #1536           7FEØ         8CØ6Ø         30         BLO @LOOP1           7FEØ         3CØ6Ø         30         LDA #96           7FEØ         AFØØ         30         BLO @LOOP2           7FFØ         3FFØ         30         BLO @LOOP2           7FFØ         BEØØSØ         30         CMPX #1503	
7FC6         8CØ5FF         20         CMPX         #1535           7FC9         2526         20         BLO         @RETURN           7FCB         3088E0         20         @SCROLL         LEAX         -32,X           7FCE         BF0088         20         STX         #88           7FD1         8604         20         LDA         #4           7FD3         C620         20         LDB         #32           7FD5         3D         20         MUL           7FD6         C30420         20         ADDD         #1056           7FD9         1F01         20         TFR         D,X           7FD9         1F01         20         TFR         D,X           7FD8         A680         30         @LO0P1         LDA         ,X+           7FD9         1F01         20         TFR         D,X            7FD9         1F01         20         TFR         D,X            7FD9         1F01         20         TFR         D,X            7FE0         8600         30         ELO0P1         LDA         ****           7FE3         2	
7FC9         2526         20         BLO         @RETURN           7FCB         3088E0         20         @SCROLL         LEAX         -32,X           7FCE         BF0088         20         STX         \$88           7FD1         8604         20         LDA         #4           7FD3         C620         20         LDB         #32           7FD5         3D         20         MUL           7FD6         C30420         20         ADDD         #1056           7FD9         1F01         20         TFR         D,X           7FD8         A680         30         @LOOP1         LDA         ,X+           7FD9         1F01         20         TFR         D,X            7FD0         A7880F         30         BLO         @LOOP1         LDA         ***           7FE0         8660         30         LDA         #1504	
7FCB 3088E0         20 @SCROLL LEAX -32,X           7FCE BF0088         20 STX \$88           7FD1 8604         20 LDA #4           7FD3 C620         20 LDB #32           7FD5 3D         20 MUL           7FD6 C30420         20 ADDD #1056           7FD9 1F01         20 TFR D,X           7FD8 A680         30 @LOOP1 LDA ,X+           7FD0 A788DF         30 STA -33,X           7FE0 8C0600         30 CMPX #1536           7FE3 25F6         30 BLO @LOOP1           7FE5 8660         30 LDA #96           7FE7 8E05E0         30 LDA #1504           7FEA A780         30 @LOOP2 STA ,X+           7FEC 8C0600         30 CMPX #1536           7FEF 25F9         30 BLO @LOOP2           7FF1 3517         30 @RETURN PULS D,X,C           7FF3 39         30 RTS           7FF4 BE0088         30 @LF LDX \$88           7FF7 8C05DF         30 BLO @RETURN           7FF0 20CD         30 BRA @SCROLL	
7FCE BF0088         20         STX \$88           7FD1 8604         20         LDR #4           7FD3 C620         20         LDB #32           7FD5 3D         20         MUL           7FD6 C30420         20         ADDD #1056           7FD9 1F01         20         TFR D.X           7FDB A680         30 @L00P1 LDA .X+           7FD0 A788DF         30         STA -33.X           7FE0 8C0600         30         CMPX #1536           7FE3 25F6         30         BLO @L00P1           7FE5 8660         30         LDA #96           7FE7 8E05E0         30         LDX #1504           7FEA A780         30 @L00P2 STA .X+           7FEC 8C0600         30 @L00P2 STA .X+           7FEF 25F9         30 BLO @L00P2           7FF1 3517         30 @RETURN PULS D.X.O           7FF3 39         30 RTS           7FF4 BE0088         30 @LF LDX \$88           7FF7 8C05DF         30 BLO @RETURN           7FF0 20CD         30 BRA @SCROLL	X
7FD1       8604       20       LDA       #4         7FD3       C620       20       LDB       #32         7FD5       3D       20       MUL         7FD6       C30420       20       ADDD       #1056         7FD9       1F01       20       TFR       D.X         7FD8       A680       30       @LOOP1       LDA       ,X+         7FD0       A788DF       30       STA       -33,X       -33,X       -36       -33,X       -36       -33,X       -36       -36       -36       -37       -76       30       BLO       @LOOP1       LDA       #1536       -36       -76       -76       30       BLO       @LOOP1       -76	
7FD5 3D 20 MUL 7FD6 C30420 20 ADDD #1056 7FD9 1F01 20 TFR D,X 7FD8 A680 30 @LOOP1 LDA ,X+ 7FD0 A788DF 30 STA -33,X 7FE0 8C0600 30 CMPX #1536 7FE3 25F6 30 BLO @LOOP1 7FE5 8660 30 LDA #96 7FE7 8E05E0 30 LDX #1504 7FEA A780 30 @LOOP2 STA ,X+ 7FEC 8C0600 30 CMPX #1536 7FE7 25F9 30 BLO @LOOP2 7FF1 3517 30 @RETURN PULS D,X,0 7FF3 39 30 RTS 7FF4 BE0088 30 @LF LDX \$88 7FF7 8C05DF 30 BLO @RETURN 7FFC 20CD 30 BRA @SCROLL	
7FD5 3D 20 MUL 7FD6 C30420 20 ADDD #1056 7FD9 1F01 20 TFR D,X 7FD8 A680 30 @L00P1 LDA ,X+ 7FDD A788DF 30 STA -33,X 7FE0 8C0600 30 CMPX #1536 7FE3 25F6 30 BLO @L00P1 7FE5 8660 30 LDA #96 7FE7 8E05E0 30 LDA #1504 7FEA A780 30 @L00P2 STA ,X+ 7FEC 8C0600 30 CMPX #1536 7FEF 25F9 30 BLO @L00P2 7FF1 3517 30 @RETURN PULS D,X,0 7FF3 39 30 RTS 7FF4 BE0088 30 @LF LDX \$88 7FF7 8C05DF 30 BLO @RETURN 7FFC 20CD 30 BRA @SCROLL	
7FD6 C30420	
7FD9 1F01	
7FDB A680 30 @LOOP1 LDA ,X+ 7FDD A788DF 30 STA -33,X 7FE0 8C0600 30 CMPX #1536 7FE3 25F6 30 BLO @LOOP1 7FE5 8660 30 LDA #96 7FE7 8E05E0 30 LDX #1504 7FEA A780 30 @LOOP2 STA ,X+ 7FEC 8C0600 30 CMPX #1536 7FEF 25F9 30 BLO @LOOP2 7FF1 3517 30 @RETURN PULS D,X,0 7FF3 39 30 RTS 7FF4 BE0088 30 @LF LDX \$88 7FF7 8C05DF 30 BLO @RETURN 7FFC 20CD 30 BRA @SCROLL	
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# Tony Bridge's Adventure Corner



## **Crawley Manor**

areraiser Pt 1 (Prelude) raised its hairy head a few weeks ago (PCW Vol 3 No 35) in the Corner, when I quoted Gillian Slade's comments on the program. I received, in the following week, several more letters supporting her views (she wasn't happy with it), but, unfortunately, none at all praising it. Haresoft, the authors, then sent me a copy of the program, along with several letters endorsing the program. So, what is the program like?

It costs £8.95, so is a little more expensive than the usual Spectrum software - is it worth the extra? The program is very disappointing; a few lines of Basic code and some equally basic graphics, some 26 "locations", with the occasional hopping hare, and, with each picture, a line of rather obscure verse. Some of the ambiguous clues (?) are: "fast like a river", "stars give extra light" and "help is here", but I haven't the faintest idea what they mean! And, quite frankly, I haven't got the patience to work it all out - but if you enjoyed the Masquerade book, and the more recent Cadbury's Golden Egg book, then you might enjoy this program (and you won't be digging up the countryside).

However, while there is indeed a very valuable prize awaiting the person who unravels the clues in this program and the follow up, the price seems excessive, especially when one considers that the Masquerade book was a sumptious production, to be kept and savoured over the years (and is cheaper than Hareraiser).

On to things of more interest to us adventurers — and the programs of Jyym Pearson. He writes for Adventure International, Scott Adams' company. He has written several adventures, but I know nothing about him, except that he created Escape from Traam, Earthquake (San Francisco 1906), Saigon: The Final Days and The Curse of Crowley Manor. The titles all sound pretty intriguing, which I always think is half the battle won. I don't get many letters about these programs, but Kwokleung Cheung has written recently from Evesham in Worcester, with a lot of hints — I hope they will help someone in trouble.

"I have completed *The Curse of Crowley Manor*, and I tell you, it wasn't easy! Here are some hints: (See the list at the end of the page.)

To get the Handaxe and Letter opener — try 6,2,11,14,17,21,7

To open the Rosemary chest: 22,3,12,23,4 To find the Vial: 24,5,13,9

When you are in the Silver Room: 27,18,28 To find the Crystal Ball: 8,20,13,25 Try: 1,26,10,12,19

Nothing to view? Then Listen!

"I have also got quite far on Earthquake 1906, which, by the way, I think is far harder than Crowley Manor."

Cheung goes on to give a lot of hints, which I will divulge at another time (although I will say that you must be careful of picking up the dog; he can do some nasty things to your trousers!) — meanwhile, he wants to know how to find the Iron Bar. Can anyone help?

To finish this week, a Brickbat and a Bouquet. The nice things are said by Debbie Barbe, from Guernsey, who says: "I must mention Dark Lore, from 8th Day. I have actually completed it and would highly recommend it, especially for beginners, as there are plenty of locations to explore, and the problems aren't too hard. There is no help routine but I don't think that is a problem. I would say, though, that you have to go round in circles a few times before you have everything you need!"

This adventure is now getting on a bit, but

I, also, quite liked it at the time of its release. If you see an advert for it, it seems worth while looking at. As I write this, I've just been sent a new range of Quill'd adventures by 8th Day. Selling at an incredible £1.75, first impressions are extremely favourable — watch this space! The brickbat is hurled by Andrew Willey, of Godalming in Surrey, who writes:

"In issue 36 of PCW you asked for opinions of The Hulk from Adventure International. Well, as far as I'm concerned, it just demonstrates that pretty graphics (and they are good) don't make up for a small adventure with rather uninteresting puzzles. Maybe I've been spoiled by the wonderful Level 9 series, but Scott Adams has always been the best as far as 'mean' puzzles go. In The Hulk, they're just not there. Or rather, they're buried in the game design so much that you might not even find them. Take the clue to staying as The Hulk for longer, that you printed. Unless you methodically go through all the domes hitting yourself, you just won't find it.

"Of course, there are nice touches — I like the sequence with the Chief Examiner! — and the style is quite a refreshing change from the norm, but there just isn't enough to it

"Incidentally, I've mentioned Level 9. I've heard that the sequel to Snowball wil include graphics. If that's true, it'll be interesting to see how they adapt from being producers of such superior text adventures to the graphic sort. I only hope they don't sacrifice too much of the amazing text detail they provide now — worth more than a picture any day!"

By the time you red this, Andrew, Level 9's new program, Return to Eden, will be a reality — I'll be reporting on it soon, but Level 9 say that the adventure contains some 250 locations and "masses of puzzles". They say that it "is fully as big as our previous games, with as much text and at least as many puzzles."

And, if you don't like graphics, you can turn 'em off!

1 Chop 2 Growth 3 Screws 4 Opener 5 Driver 6 Make 7 Food 8 Open 9 Taxi 10 Wall 11 Eat 12 With 13 In 14 Plate 15 In 16 With 17 Of 18 Crystal 19 Handaxe 20 Desk 21 Delicious 22 Undo 23 Letter 24 Look 25 Study 26 Plywood 27 Drop 28 Ball.

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This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street. London WC2P 3LD.

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# Peek & Poke



### **Bubble Trouble**

David Wilson of Manchester writes:

I use my BBC B for business having programmed it to list all the magazines which we deliver to our 800 customers.

The magazines, including Popular Computing Weekly, are stored on one tape as I find most disc drives expensive. I have however heard of a bubble memory which stores on program for instant access but when I asked Acorn all they would tell me was that it was not one of their products.

Could you please tell me if this type of memory will provide the facilites for saving one program and, following alterations twice per week, allow the amended program to be saved again?

A Bubble memory on the BBC, it's an intersting thought... The idea of bubble memory was first brought to my notice in 1969, so it's by no means a new idea. To date though, no one has managed to produce any such storage for anything like a competitive cost when compared to disks.

It is extremely doubtful if bubble memory will become available for the BBC, and if it did would almost certainly cost more than a disc drive.

### Tape to Disc

P Earley of Southampton,

Melp ... I'm getting a disc drive for Xmas and I am in a fix. All the programs I like are on cassette. Can I buy the tapes and

use a tape to disc copier program to put them on to disc, and then sell the tapes, or is this pirating? Alternatively can I get the shops or manufacturers to put them on disc and charge a little extra.

This question of transferring software from one medium to another has been asked many times. It is a well known fact that disc owners transfer their cassete programs to disc for convenience and speed of loading. Selling the original tape copies is as much pirating as copying a cassette to a blank tape and then selling the original. Also, whilst some shops and indeed some software houses do offer disc versions of popular software, the majority still provide a cassette only service. Quite frankly, you should follow your own conscience - but I would definitely not sell the original games if I were in your posi-

### **Typewriter**

Les Rothera of Leeds writes:

Q I don't know if this is up your street or not, but here goes. Besides fiddling away with my 48K Spectrum, I also help out with a Visually Handicapped Drama Group.

Once a play has been selected for production, my job is to transfer the play on to cassette, and then the blind person selected for a role has to laboriously transfer my speech into readable script using a Braille typewriter.

My query is this: I have heard that there is a new Braille typewriter out, possibly computer controlled, which does the job in half the time, and the script can be read as it comes from the keyboard. Have you heard of such a machine? If so, could you supply me with costs, etc?

you supply me with costs, etc?

There are a number of Braille typewrites available on the market, but to date I have not been able to locate a dealer who can supply me with a price. One possibility that you might consider following up is to contact the British Computer Society, Portland Place, London. They have a 'special interest group', who are very active

in promoting the use of computers by visually handicapped people.

### Data File

J J Longworth of Darwen, Lancashire, writes:

On the Vic20, after typing Open 1,1,1 "PROGNAME" Cmd 1; List the tape saves data to tape. In the book Mastering The VIC20' (where this example comes from) it says that it is an Ascii data file.

What I would like to know is, what is an Ascii data file and how do I retrieve it?

You may know that the computer holds and recognises charcters using what are called the Ascii character codes. These codes are listed in your reference manual. So when the book refers to an Ascii data file it simply means that the Ascii codes are used when writing your program listing to the tape. You have probably realised that the statements you typed in diverted the normal List output from the TV screen to the cassette. To read it back you need to use the Get# statement, or the Input# statement, after of course Opening the file in Input mode.

### Saving it

John Ledbury of London writes:

Please can you help me with my Vocabulary Quiz program on my 48K Spectrum? I have English words in A\$)W,13) coresponding to foreign words in B\$(W,13). I think I have saved them OK by Let G\$ = A\$(W)+B\$(W);Save "m':1; FOREIGN" Data G\$(). What I'm trying to do is Load G\$, find the Val of W from its Len and then split G\$ into A\$ and B\$. but it doesn't work.

I've got a feeling that I sould be using Open#, but I don't understand this in the

manual, and since I need a tape cassette version, I'd be grateful for your comments.

I presume from your letter that W is not a constant value and that you are not able to determine it from any source other than your saved data.

If you want to save to casfollowing approach:

Dim A(1):Let A(1)-W :Save "W" Data A() Save "ENGLISH" Data A\$() : Save "FOREIGN" Data B\$

Then you simply have to Load in your three arrays (remembering to Dimension A\$ and B\$ after reading the value of W). The same principle will apply to microdrive, or disc.

### Loading up

Bob Ellis of Chester writes:

I have a Model 1 RS 80
with a disc, and I also
have a Spectrum.

I can use my TRS 80 to work out and store the Z80 machine code and also transfer it to tape, but my problem is in loading it back into the Spectrum. Perhaps a routine for loading the different format could be loaded into the RAM of the Spectrum.

A The different methods of saving and loading proggrams and data used by the different micro manufacturers is a source of major problems to anyone who is interested in exchanging or converting programs. There is no standard method of achieving the desired effect but it could probably be best achieved by arranging for the TRS 80 to produce Spectrum compatible files on cassette.

The Spectrum Rom contains extensive cassette handling routines (starting at address 04c2 hex) which are described in detail in the Complete Spectrum Rom Disassembly by Ian Logan and Frank O'Hara.

By adapting these routines for the TRS 80, I think that you will be able to achieve the desired effect.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, 12-13 Little Newport Street, London WC2R

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than year old! ONLY £120! Also TANDY CGP-115 Printer. £95. Both boxed. Together £205. Tel: 01-360 3443. COMPLETE SYSTEM, Dragon 32k cassette recorder, Hitachi 18" colour TV, Oki Microline 82 line printer. £60 of s/w/books + all leads. Cost £750. Accept £400 ono. Tel: 03752 4552. DRAGON 32 'POKER' with full colour hi-res graphics and sound. Send

Crescent, Shipley, West Yorks. DRAGON 32, AS NEW, with 2 joysticks, cassette recorder, software, books (including Machine Code), magazines. All leads, £89. Strathblane (nr Glasgow), Tel: Blanefield 70498.

cheques/PO's to: P. Perris, 88 Poplar

DRAGON 32 + Dragon disc drive + 2 joysticks + hi-res cartridge + DASM tape + printer cable + various books and magazines. Phone weekdays after 5pm. All excellent condition. Offers around £200, Mr M. Swanson (0790)

DRAGON 32 FOR sale. Boxed with leads, joystick, books, mags, and £100 of software including best titles. All for £90 or nearest offer. Please contact Richard on Ramsbottom (070682)

DRAGON 32 PRINTER, s/w books, mags + joysticks. Offers. Tel: 061-723-5621 (Louis Jnr) after 7pm.

DRAGON 32, 2 JOYSTICKS £80 of s/w. One cartridge, 9 months old. As new. Will run double speed. £200 ono. Tel: Colwyn Bay 30174. Buyer collects. DRAGON 32 FOR SALE. Joysticks, tape recorder, magazines, over £700 original varied software inc. 10 cartridges. Bargain at £440. Ring Luton

38834 after 7 pm. DRAGON BOOK for sale, Enter The Dragon £3.00 ono. Tel (David) 0236 29808 (between 5pm and 7pm) quick

DRAGON 32 COMPUTER complete with joysticks £100 worth of software and books £125, Tel: Norwich 419044. DRAGON 32, 1 JOYSTICK, £90 of software including 1 cartridge, mags, cassette recorder + leads + manuals. Sell £100 + DASM/Demon assembler monitor + 2 m/c books sell £25. 047485 2026

MUST SELL MY DRAGON 32 + joysticks + dust cover + DOS cartridge and Dragon Drive + various books and magazines. Offers around £190. Can be inspected. M Swanson, 5 High Street. Spilsby (0790) 52120.

DRAGON FOR SALE cartridge. Many original games box and manual joysticks dust cover £125. Phone 0484 665281 after 5pm.

FOR SALE DRAGON 32 and lightpen and joystick and dust cover and magazines for £80 ono. Buyer must collect. Phone Robin on Thetford 3654 Church On Way, Churchill Rd, Thetford. DRAGON 32K SOFTWARE for sale. Ring Of Darkness, Pettigrew's Diary, Knife Of Kishtu, Inspector Clouseau, Treasure Tomb and others £2.50. Pair joysticks £4 Dragon books £1.50 each phone (0703) 433701.

### For Sale

ABSENT PRINTER. Absent FX80 Hi Res dot matrix, C Keystor interface for Spectrum. Owner upgrading £330 ono. Tel: 01-674 7795.

LYNX 48K in excellent condition, manuals, tapes, leads and user magazines included. £130 ono. Phone 01-561 4653 (Hayes, Middlesex) and ask for

H.C.R's EPROM programmer for sale £30 ono. BBC Software for sale, dictator, atom smasher, challenger, humphrey, arena 3000, checkout, swoop, legion sixers, Monaco Ghouls, £3.50 each. Phone 736 7714, ask for Satvinder.

LYNX SOFTWARE. Smashout, racer, protector, deathball, monster mine. Any memory, £2.50 each or £10 the lot. Phone 0422 75366.

TRS 80 COLOUR computer software. Pyatt, 23 Arundel Drive, Orpington, Kent.

T199/4A MODULES, Parsec, Alpiner and Chess, £12 each, or swap one for any two of following - Chisholm Trail, Zero Zap, Video Games or Adventure Cassettes. Tel: (0206) 562187 eve-

DISK DRIVE (TEAC). Half Height, Double Sided, 40 track with???? for 3BL £150 one. Tel: 0302 840768. BROTHER EP22 electronic typewriter/

printer, A4 size sheet + roll paper, plus ZX Spectrum, Tasman RS232 interface and softwareTasword masterfile, etc. £150 the lot or sell separately. lain, Tel: Livingston (0506) 34497.

CURRAH MICRO speech, v.g.c., £20. Tel: 0474 50791

TRS80 LEVEL 2 16K + £100 s/w + printer cable, £150 ono. Tel: 0884 702405

EPSOM RX80 printer, hardly used, £175 ono. Tel: 01-441 4836 after 6 p.m. CUMARIA DISK DRIVE for BBC micro. Any offer over £100 or will swap for working 48K Spectrum. Tel: 038482 7739.

I HAVE 12" b/w TV, 2 months old to sell for £30. (Boxed). Reason for sale, I have bought a colour monitor. Write only to A. Beale, Moorlands Cottage, Drumlithie, Kincardineshire, Scotland. BRAND NEW, unopened QL, £450 or swap for CMB 64 plus printer and disk. Tel: Paul Scott on 080622 225 quickly!! ATMOS 48K brand new c/w tape player, four inline 13a socket, 1 year's

### COMPUTER SWAP

### COMPUTER SWAP Please write your copy in capital letters on the lines below

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap. Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343.

All software offered through computer swap must be in original condition and for private sale

It cannot be swapped. Warning: It is illegal to advertise pirated software.

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subscription Oric Owner, £120 ono. Dragon, Hi-Res Cartridge, £18. M. J. Swanson, Spilsby, Lincs. Phone Spilsby 52120.

ORIC 48K + £70 software for sale or swap for CBM 64 disk drive. Will make cash diff, up or sell for £80. Tel: Notts (0602) 306030 after 4 p.m.

TRS 80 MODEL I expansion interface wanted with or without memory. Tel: Nottingham 812894, ask for Ted. ARCADIA, SPACE JET, Cosmied, La-

zer Zone, The Catch, Mags, on the tape, Omega Race Game, £15. Tel: Liverpool 7289082

WOODCRAFT 40 £60.00 (word pro package). Also dialogue £20.00, data base ??? and table pro. Both for CBM 64. Tel: Woodbridge 7297 after 6 p.m. SEIKOSHA GP 1006A Pmte, Centronic, interface ideal for BBC, Dragon etc. Excellent condition £180 ono. Tel: Harry 01-603 9315

ORIC I 48K - s/w £90.00. Tel: 061 881 5663. Anytime.

S/W INC. Fighter Pilot, Trans, AM, Beaky and the Egg Snatcher, Kong, Flight Simulation and many more. £3.50 (Originals). Tel: Kamlash 01-861 0340. VIDEO MASTER Star Chess. W. Power Pack and Controllers for a Currah Micro speed unit or £18 cash. Tel: Southend

PRINTER DATA dynamic 39120 teletype, £50.00. BBC Rob socket board, Watford Elec, £5.00. Com Chess Mate, £15.00. Tel: (0875) 31076, Steve. 2-WAY TV PLUG, connects Computer

and Arial together, £2.50. ZX Printer, several rolls of paper, £35. 95 Green Park Road, Southampton. 786925.

**BROTHER EP44** printer typewriter with roll holder, adaptor + paper , worth £270. Perfect. Sell £180 ono. Call Pete on 01-727 9947 (eves.).

FOR SALE. Skramble, Troopa-Truck, Chuckie Egg, Assembler 64, Arabian Nights and Music Composer (cartridge), around £4 each. All originals and for the CBM 64. Contact Phil 0385 730380 (evenings).

CURRAH MICROSPEECH and Microslot for sale. Both hardly used, £30 the pair. Thame 2873, evenings.

48K ORIC Atmox + lots of software (Xenon-1, Zorgon, Marc etc.) + accessories (books etc.), five months old. Cost £260 new, sell for £120 ono. Genuine sale! Tel: (0222) 842817.

T199/LA INC. Donkey, Kong + Pole Positions, cassette lead, Joystick adapter + cassette games inc. 99 Vaders, Robopods Man + Monsters, 30 Road Race, £130. Gravesend 59862.

FOR SALE - TI99/4A accessories and games - spech synthesizer and speech editor command module, £30. Texas, beginners basic tutor, £4. "Pilot" Flight Simulator by Apex Software, £3. Phone Warwick (0926) 498388.

48K LYNX, as new, boxed with manual and leads inc. Dungeon Adven. and Lynx computing book. Excellent condition, worth £245. To you £150 (ono). Phone Anthony on (0484) 24144.

ALPHACOM 32 line printer. For any Spectrum or ZX81. Hardly used, under guarantee, £45. Tel: Burton on Trent

FULLER BOX - three channel sound synth, beep, amplifier, joystick, port cassette, filter plus back port to connect other peripherals. Software that exploits unit's potential included. Phone Phil (0952) 8592865, evenings.

A AH QL for sale. Offers? Tel: Julian, 01-338 2623 days, 01-435 1738 eves. SHARP MZ-711, very good condition, six months old, built in cassette, 15 games, manual, £170. No offers, Tel: 521 9010.

PRISM VTX 5000 Spectrum/Prestel Modem. As new. £40 ono. Tel: Martin (Leeds) 0532 686519.

FOR SALE. Pirate adventure by Adventure International and Aztez Challenge for CBM 64, £6 each or swap for two Scott Adam's Adventure Lap-Ki Kan. 176A Wandsworth Road, London SW8

SHARP MZ-700 for sale with built-in cassette recorder and software. Offers over £160. Phone 0383 416724, ask for

INTERFACE WITH trans AM Cartridge, and 2 Quickshot Joysticks, DK Tronics Keyboard and 8 games for sale, £70 ono, or will split. Tel: 041 558 9789. INTERFACE I AND II micro drives. Eight cartridges, boxed as new, £140. Also Currah Micro Speech, £20. Telephone 0248 680884. Bangor, North Wales. Call after 6 p.m.

TEAC 51/4" disk drive, £110. Tel: 0203

FOR SALE, half price, Pimana, Uncle Groucho, Yakzee, MMTB, Go to Jail, Raiders of the Cursed. Tel: 01-594 2281 after 5 p.m. Mr Wong, Essex.

16K COLOUR GENIE with software and some extras, e.g. Parralel Printer Interface. Sale for £95 ono. Tel: New Milton (0425) 618200. Ask for John. SHARP MZ 700 Basic Tape, £10. Tel: 01-578 2887, after 4 p.m.

OVER 100 Mags. with plenty of programs inside to swap for Texas 99/4A programs, pre 1984, one for one state Which Computer system. Wayne, 105 Wellstone Avenue, Bramley, Leeds LS13 4EH

FOR SALE, TRS-80 CGP-115 plotter. Brand new condition, £80 ono; also TRS-80 80-column dot-matrix quick printer, £50 ono. Tel: 0966 33441 after 7

48K ORIC ATMOS + lots of software (Xenon-1, Zorgon, Marc etc.) + accessories (books etc.). 5 months old. Cost £260 new. Sell for £120 ono. Genuine sale! Telephone (0222) 842817.

ATARI 600XL cassette recorder, 3 cartridges, 4 cassettes, joystick, book. £150 ovno. East Peckham 871735.

APPLE IIe with two Apple disk drives, controller card and Apple Monitor III. Excellent condition - virtually unused £750. Tel: 06285 25895 (eves).

15 D32 CARTRIDGE board complete less Eproms, £5.00 each. Ideal for hobbyist or development - cases also available. Tel: Staines 58707.

SHARP MZ700 with built-in data recorder, 64K memory, used twice, still boxed with 10 games, £150. Tel: 0702

M/C monitor for Vic 20, £15.00. Trashman for Vic 20, £5.00. Tel: 021-784

15 DIFF. D32 cartridges and manuals etc., F/S, or swap for Dragon hardware or W.H.Y. Also, Dragon 32 tapedisk pro. wanted - will swap original Premier delta-tape to disk cassette. Also broken D64 wanted or very cheap working one. No s/w needed. Tel: Staines 58707 after

VIC 20, C2N cassette recorder, 16K Rampack, Joystick, £200 of Games and Mags. Tel: 01-385 2699. Worth £400, sell £230 ono.

APPLE IIe with 2 Apple disk drives, controller card and Apple Monitor III. Excellent condition. Virtually unused, £150 Tel: 06283 25895 (eves.).

BOTEMPI ELECTRONIC organ, Partachess chess computer. Atonicair ionizer valued at £160 to swap for either a Spectrum computer or any other Colour computer. Tel: 01-315 0546.

CBM64 GAMES tape including Car Race, Plane Attack, and a Day At The Races with full colour and hi-res graphics cost £3.50 (inc p+p) Phone Stourbridge 372121 and ask for Russell.

INTELLIVISION WITH nine ROM cartridges including lock and chase. Boxed and as new. £100 or near offer or swap for Sinclair Spectrum. Tel: Alex on (01) 310 8109.

ACORN DFS KIT. Complete with fitting instructions. Any offer around £75. Also have 6116-LP3 CMOS RAM chips £3.15 each. Ring 01-202 6410 after 6pm. L. Vekaria.

FOR SALE TI-99/4A computer v.g.c., many cassette and cartridge games, extended Basic, Speech Synthesiser, cassette leads, joysticks, dust cover and program books. Will not split £160.00 o.n.o. Phone Soton 734100. FOR SALE 'O' Level History and

Mathematics. Brand new £100.00 to suit CBM 64 (cassette). I am also looking for software cassette or disk. Tel: 051 423 5493 after 6.00pm.

PCW 95, ISSUES including entire volume 2, £13, PCN 35 issues £5, New 17 issues £1.50 VGC. £18 the lot. Will not split, buyer collects. Tel: 0663 63421 after 6om.

SWAP ORIC in excellent condition with all leads and manuals etc. and £80.00 (approx) of software for Amstrad CPC464 with mono screen or sell for £120.00 ono. L.B. Staples, 2 Old Road. Chatham, Kent ME4 6BJ Tel: 48320. PRINZTRONIC HOME entertainment centre (VC 6000) and 12 cartridges. All in excellent condition and original boxes. May split cartridges. Offers to Canterbury (0227) 58529.

OVER £160 ORIGINAL software (BBC), (arcade + adventure). One cassette pack, 42 various computer magazines. Software includes The Hobbit adventure + book. BBC Basic programming book. Bargain at £60. Tel: (0924) 253265

TI99/4A MINI Memory -- Editor assembler £36.00 each + P&P. Blasto cartridge £7.00 + P&P. Tel: 0245 72572 after 6.00pm.

TEXAS TI44/9A inc Speech Synth, 7 modules, 4 cassettes, program book and all necessary leads etc £175 (will split). Tor Valley (0407) 741576.

BBC MODEL B, DFS, LVL dual disc drive, BBC data recorder, hundreds of programs on disc and cassette. All manuals, leads and lots of extras. May split. Offers to (0227) 58529.

DOWNSWAY PROGRAMMABLE joystick interface plus Cambridge joystick. VGC. Cost £33, will sell for £20 ono. Ring 0664 63421 after 6pm. Ask for Stephen.

DRAGON SOFTWARE, all originals include Ring Of Darkness Parts One + Two, Petigrews, Dungeon Raid, Devil's Assault, Invader's Revenge, Pimania, all at 1/2 price. Tel: Mark on Ragian 690394 between 9-5.30.

HEH!! HEH!! I'M MAD, I'm selling "Easyfile" for the Commodore 64 at only £35 (R.R.P. £50) and "Intro to Basic no. 1" only £7 (£14.95) or £40 the two 0558 822509.

SWAP AQUARIUS COMPUTER, 16K RAM pack. Manuals plus books, leads and 7 games cassettes for Philips N1700 Video recorder, must be working or £80.00 cash. Manchester area phone 248 6064

SOFTWARE FOR ATARI and CBM 64 computers from £1 (Dallas Quest Atari, disc £9). Cassette/disc/ROM. All originals as new. Ring Slough 71392. TI-994A + EXTENDED Basic, Speech Synthesiser + ten cartridge games, manuals etc. Yours for £100. Phone (0698) 749409 after six pm.

SWAP YAEUS FT-101Z H.F. Transceiver also Yaeus FC 902 A.T.U. for home computer BBC-B with software and hardware. Cecil, Whiteabbey 61997, N. FOR SALE: QUICKSHOT One joystick plus interface. Fnatastic cond. Hardly used, worth twenty (20) quid. Going to you for only ten (10) quid. Ask to speak to Matthew. Matthew Leguen de Lacroix, The Old Vicarage, Wenhaston, Suffolk IP19 9EG Tel: 050 270 339. TELETYPE: WEST REX (ITT) ASR33 with tape punch/reader 20 m.A loop, v.g.c. with parts manual £90. Tel: Simon 01-534 5414.

APPLE II BUSINESS System with 5mb hard disk, MX100 printer, VDU 51/4" floppy disk, s/w. Sale/purchase/nominal wages. Backup available. £1,000 +

SHARP MZ 700, tape deck + plotter printer built-in, £150 s/w. Costs £550, still under guarantee. £330 o.n.o. Quick sale. Tel: 01-561 1875.

ORIC 48K HOME computer for sale. Excellent games machine with lots of memory space for your programes. With manual, software and complete ROM disassembly. Sell for £80.00 Tel: 0734 733879.

SWAP 48K SPECTRUM, joystick and interface, software, dust cover, cassette recorder (guaranteed) for CBM 64 with C2N. Phone 01-907 1204.

COLLECTORS' ITEMS back copies of Popular Computing Weekly including Volume One issues. For sale 60p each including postage. Please 'Phone 01-650 7347 (Beckenham).

SWAP 40 CHANNEL CB for super charger (Atari). Tel: Naeery 0582 599

2 MICRODRIVES + I/F, 2 cartridges, £120 (1 month old). Tel: Paul 0474 61888

FOR SALE SV328, with cassette drive, joystick and six games tapes, also Sprite editor. Worth £356.81 new. Sell for £280 ono. Tel: 271 2398 after 4pm. MZ 711 INCLUDES data recorder for sale + £30 scftware + books and magazines £150 for quick sale. Phone Lancaster 0524-39418 after 8pm.

VICMON MACHINE code cartridge £15 "Boss" Chess cassette -(Vic20). Tel: 021-453 1812.

FED UP WITH TYPING in loads of Spectrum m/c numbers? then send your listing + 70p + 20p for every average screenful of numbers to Martin Peapell, 61 Whitworth Road, Swindon, Wilts. SN2 3BQ.

SPECTRUM GAMES for sale. 48K only Krakatoa and Mad Martha II £3, Flight Simulation £4, Pimania £6. 16K Froggy and Morris Meets Bikers £3, Yakzee £2. Martin Peapell, 61 Whitworth Road, Swindon, Wilts SNQ 3BQ

LYNX 96K, disc drive, printer interface and over £50 software. All brand new and boxed. £400 one or swap for C64 system with cash adjustment. Tel: Morecambe (0524) 415436.

APPLE IIE with disk and monitor books & software. DOS and PODOS manuals 3 months old. Perfect working order. £850 or swap for BBC with disc + cash. Avlesbury 748142.

WORDWISE ROM plus manual will sell for £30. Print-Master ROM also for sale £20. Both are originals. Also CYB Mail Merge for Wordwise £15. For details tel: Rugby 812940.

TELETEXT DECODER sell or exchange for Electron plus 1 interface or any other add-ons, joystick, adaptors, I/O ports, A/D converters etc. Mr R. Mackay, Brochrobbie, Brora, Sutherland, Scotland KW9 6NE.

SHARP MZ 700 64k, almost new with tape recorder and pack of ten games. Offers around £200. Quick sale. Tel: Heywood 64739.

SWAP TEXAS TI994A for any Spectrum. Tel: Maidstone 53760.

### Wanted

WANTED BBC model B. Preferably with cassette recorder, £250 cash available, 029 921 566.

WANTED T199/4A poll position module + only books or literature. Tel: Mike 0482 868395 after 5pm.

FULLER BOX with manual and demo tape unused will swap for Currah U Speech and tape or sell for £20. Phone 051 924 6998 after 5pm.

SWAP SPECTRUM, cassette recorder, interface I, microdrive, joystick interface, speech synthesiser s/w. For CBM 64 + cassette Tel: 374 218 Sheffield. WANTED ONE COMMODORE 64 with extras. Calla Havant (0705) 743968 after 6pm.

SWAP ELECTRIC GUITAR and amplifier also other bits for 48K Spectrum or 64 column printer or software or anything else. Phone Aberdeen 742358 after 8pm. Ask for Alan.

SWAP INTELLIVISION and 5 games, for 48K Spectrum + Kempston interface + joysticks or sell for £140 ono, 01 361 1933. D.E. Lacy.

WANTED: Newbrain technical manual, Assembler/disassembler, RS-232 leads details to: Andrew Burley, 55 Essex Road, Southsea, Hants., PO4 8DG

SWAP ATARI 600XL with program recorder plus all leads for Spectrum 48K with leads or will sell for £100 call 393 Pegasus Court Blackbird Leys, Oxford. SWAP £250 12 speed Peugeot racing bike for Commodore 64 and C2N tape deck. Or sell for £190 ono. Phone Middlesbrough (0642) 822998 and ask for Marpel.

SWAP DRAGON 32 with printer/plotter and software also Genie II with expanded twin disc drives and software for Commodore 64, recorder, 1541 and good printer. Tel: 0702 332964. Will travel.

SWAP. Ham International Puma 120. Ch. Transceiver. P.S.U. aerial value £130. For computer and software of equal value. This is a first class transceiver. Tel. 0294, 57164

WANTED (ORIGINALS) absolutely any Vic-20 game/utility/adventure (anything). I pay 75p a tape. Send tape plus S.A.E to Mr Gary C Wierlina. Corrina West Main Street, Blackburn. FH47 71 P. Scotland

SWAP PRESIDENT Madison multimode base station C.B. + disk desk mike for Oric I 48K or Spectrum. Tel: Paul, Luton 421534 (anytime).

WANTED NEWBRAIN + manual. Any s/w (no games) Ring 0327 703964. SWAP MY KEMPSTON type interface and Quickshot II joystick plus over £100 of top Spectrum software and books for Alphacom 32 or ZX printer phone. Warrington (0925) 810403 after 4pm. SWAP 6X3 snooker table with cues pool balls for Spectrum. 0702 540452. WANTED ZX MICRODRIVE and interface I for around £60 phone: 01 907 1204

SWAP £65 OF C64. Software Quickshot II joystick, HCW since August 1983. For Brother HR-S, Alphacom 42 or C64 Printer. Tel: 045 275 494 after 4pm. Ask for Martyn.

ORIC MCP-40 printer centronics cable, new pens, paper £80. Oric-1 16K computer with Oricmon Assembler "Oric Companion" book. Game £50 phone Belfast 671734.

SPECTRUM S/W wanted, the prize, Rapscallion, Star Trader, Hulk, and any new games. Will pay £3-5.00. Phone 368-3784 London ask for Sam. after

WANTED 48K Spectrum, Oxford area. Tel: Wantage (02357) 65856.

### ADVENTURE HELPLINE

Inca Curse on Spectrumi can't get any points or get through the port-hole or past the fire room. Gareth Crinks, I Hospital Cottages, Bridge Street, Clay Cross, Derbyshire.

Adventureland on Vic20. I find it impossible to collect thirteen treasures when one has to be given the bear so that I can collect two other treasures. Darren Reynolds, 8 Farmbridge Way, Bentley, Walsall, West Midlands.

Hobbit on Spectrum. After arriving in the goblin's cavern lif by torches I am unable to escape — always returning to the goblin's dungeon. M A Fitzgerald, 37 High View Avenue, Grays, Essex.

Siren City on Commodore 64. I can't seem to destroy the clouds of gas or the bombs. Please can you tell me how to do it. Andrew Fowler, 56 Iona Way, Davyhulme, Manchester.

The Quest on Commodore 64. I cannot get out of the first set of rooms. I have got the sword out of the rock floor but don't seem to be able to get any further. Keith Irving,

42 Abbey Crescent, Kinloss, Forres, Morayshire.

Ten Little Indians on Commodore
4. I can't get any further than
6. Style or upstairs. S Gardiner,
3 Fry Close, Hamble, Southampton.
Quest on Spectrum. I keep getting
stuck, I can't survive the attacks, I
can't solve the clues and am now
utterly confused. Michael Donaldson, 27 Langtree Close, Bude
Road, Bransholme, Hull.

Hobbit on Commodore 64. I can't get past the golblins gate. Andrew Hampton, 105 Vincent Road, Becontree, Dagenham, Essex RM9 6AI.

Magic Mountain on Spectrum. How do you get up the other side of the vast crevasse? And how do you get through the cave entrance? Debbie Barbé, Vista du Guet, Cobo Road, Castel, Guernesey, Channel Islands.

Ten Little Indians on Commodore 64. How do you open the large wall safe in the study and is there anything you can do to the couch in the lounge? I A Davidson, 44 Glenwood Gardens, Bedworth, Warwickshire.

Adventureland on Vic20. How do you pass the bear without giving it the honey? D Currie, 14 Turnberry Court, Kilwinning, Ayrshire.

Hitch Hikers Guide to the Galaxy

on Spectrum. How do you get past the Algolian Sun Tiger? What are the uses of the mouse, the metal plaque, the set and the poster. J T Melsom, 2 Chilton View, Saunderton, High Wycombe, Bucks.

Castle of riddles on BBC. I cannot get through the jet black maze having done the other two passages. Isobel Michael, Eavisdown, St Swithins, Winchester, Hants SO21.

The Hobbit on Spectrum. I went NE from the great river and then tried to go E but got 'You cannot go East, the place is too full to enter'. Is this a fault? I B Young, 30 Ravenswood Drive, Glenrothes, Fife, Scotland.

Voodoo Castle on Vic20. How do you shrink? How do you get into the room up the flue? And where is the doll? Lee Borrell, 73 North Road, Audenshaw, Manchester.

Hobbit on Spectrum. I don't know where to go when I've got the Dragon's treasure. Philip Benger, 63 Oakleigh Avenue, Edgeware, Mddx.

The Hobbit on Spectrum. I can kill the dragon and return with the treasure but my score remains at 60–70 per cent. How can I improve it? Neil Exton, 44 Bridge Way, Shawbury, Shrewsbury, Salop.

# Diary

Event	Dates	Venue	Admission	Organisers
Computer Games and Systems Retailer Show (trade only)	Oct 17-18 9.00am-5.30pm	Novotel London W6	Free	Macro Exhibitions 0992 469536
Home Computer Education and Games Fair	Oct 20 12.00pm-8.00pm Oct 21 10.00am-6.00pm	Luton College of Higher Education	£1.50 adults £1.00 children	Shaw and Kilburn 0582 29511
Electron and BBC Micro User Show	Oct 25-27 10.00am-5.00pm Oct 28 10.00am-4.00pm	Alexandra Palace London N22	£3.00 adults £2.00 children	Database Publications 061-456 8383
Home Tech 84	Oct 26-29 10.00am-6.00pm	Bristol Exhibition Centre	£1.50 adults £1.00 children	Nationwide Exhibitions 0272 680465
Computers in Action	Oct 30 10.00 am-6.00pm Oct 31 10.00am-8.00pm Nov 1 10.00am-6.00pm	Anderson Centre Glasgow	Free	Trade Exhibitions 041-204 0280
Mycomp (Thames Valley Personal Computer Exhibition)	Nov 1-3 10.00am-6.00pm Nov 4 11.00am-8.00pm	Pulcrum Centre Slough	£2.00 adults £1.00 chil <del>dt</del> en	Swan House Special Events 09322 43896
Home Computer Show	Nov 7 2.00pm-9.00pm Nov 8-10 12.00pm-9.00pm Nov 11 12.00pm-6.00pm	Royal Dublin Society (Main Hall) Ballsbridge Dublin 4	£2.00 adults £1.00 children	SDL Exhibitions Dublin 904171
Buxton Home Computer Fair	Nov 10 10.00am-5.00pm	Paxton Suite Pavilion Gardens Buxton	£1,00 adults 50p children	Technical Promotions 0298 6174
Home Computer Exhibition	Nov 10 10.00am-6.00pm	David Davies Gallery Newtown Powys Wales	20p	Newtown and District Computer Club 0686 28715
Microelectronics Applications	Nov 10 10.00am-4.00pm	Barden High School Burnley Lancs		Barden High School 0282 36324
London Micro Market	Nov 10 10.00am-6.00pm Nov 11 10.00am-4.00pm	Wembley Exhibition Centre	£1.50 adults 75p children	ECC Publications 01-359 3525
6809 Colour Show for Dragon and Tandy Users	Nov 17-18 10.00am-6.00pm	Royal Horticultural Halls London SW1	£2.00 adults £1.00 children	Computer Marketplace 01-930 1612

# Top 10

# **Book Ends**

Vic 20	Commodore 64
1) (8) Computer War Creative Sparks 2 (—) Duck Shoot Mastertronics 3 (1) Flight 015 Craig Communications 5 (—) Jet Pac Ultimate 6 (9) Mane Gold 7 (10) Tank Commander Creative Sparks 8 (3) Chator Race Micro Antics 9 (2) Shooker Visions (Figures compiled by Boots Webster)	1. () Daley Thomson Docathloo. Cosan 2. () Beach Head. Contresoft 3. () Football Manager Addictive Games 5. () Space Pilot Mastertronics 6. (2) Henchback 7. () Kensington 8. () Monty Mole 9. (5) BMX Racers 10 (7) Manic Miner (Pigures compiled by Control Mastertronics Software Projects (Pigures compiled by Control Mastertronics Software Projects Control
Dragos  1 (4) Hunchback Ocean  2 (—) Kriegspiel  3 (—) Kriegspiel  4 (2) Drago Daxkness  5 (2) Ring of Daxkness  Cave Fighter  7 (1) Curhbert in the Mines Microdeal  8 (5) Chocolate Factory Minist	ZXB1  (2) Planet Raider Novus  3 (1) Walk the Plank Novus  4 (3) Black Crystal Pss  (-) Asteroids Cuicksilva  (-) ZXF forth Sinclair  5 (4) Flight Simulation  Figures compiled by Books/Websters)

Atari l	(-)	Airstrike II	English Software
2	(5)	Zaxxon	Centresof
3	(3)	Leggit	Imagine
4	(2)	Caverns of Khafi	ka Centresof
5	(-)	Captain Stickys	English Software
	(6)	Krazy Kopter	English Software
7	(4)	Slinky	Centresof
В	(9)	Computer War	Atar
9	(-)	Shatablast	L&I
10	(8)	Orc Attack	Websters)

Frogger
 Mansion Adventure 1 compiled by Boots/Webster

		10 (-) Diffie tricies	(tractobow)
Bool	CS.		TEACHT.
1		CBM Prog Reference Guide	Pitman
9	=	Very Basic, Basic for the Spectrum	Century
2	693	60 Progs for Commodore 54	Pan
9	(3)		D. Kindersley
9	(6)	Step by Step Prog on the Spectrum	
5	(9)	Sinclair user book of Programmes & Games	Penguin
6	()	Discover your Spectrum	Century
7	()	60 Progs for the Spectrum	Pan
o	(8)	Make Most of Micro Drive	Granada
8		Beginners Micro Guide	Granada
8	(10)		Granada
10	()	Spectrum Sound & Graphics	
	(-)	Business Systems for CBM 64	Granada
	2000	(Figures compiled by Boots/Webstern)	

### SCANTY

(Hewson)

(Vortex)

(Hewson)

(Beyond)

(Argus Press)

(Addictive)

(Beyond)

(Acornsoft)

(Aadvark

(Acomsoft)

(Superior)

(Superior)

(Micropower)

(Micropower)

(Pace) (Database)

(Melbourne House)

(Psion)

1(2) Daley Thompson's Decathlon

2(4) Full Throttle

6(1) Avalon

10(-) Psytron

1(1) Elite

3(2) Fortress

5(8) Aviator

8 (9) Stock Car

7(6) Wallabies

9(7) Ghouls

8(8) Smash & Grab

BBC B

3(8) Tomado Low Level

4(4) Matchpoint 5(-) Sherlock Holmes

7(3) Lords of Midnight

8 (7) American Football

9(-) Football Manager

4 (4) Micro Olympics

There must be more guides to the QL than there are computers. Lionel Fleetwood's contribution (The Sinclair QL - and how to use it) aims itself at the small business user and devotes about equal space to the machine itself and its package of programs.

Though it is ostensibly written for the novice, too often jargon is explained by further jargon. The index is scanty: several topics, such as the revised operarting systems, are ignored; and the general approach is uncritical.

To quote: 'If you find this confusing, spare a thought for me. I have to explain it!' I would advise finding somebody who can do a better job than Mr Fleetwood.

The Sinclair QL - and Book how to use it Price £7.50 Micro Sinclair OL Supplier Sigma Press, 5 Alton Road, Wilmslow,

Cheshire SK9 5DY

### **GFNFRAL**

The Micro Enquirer is a largeish, thickish book which manages to find a wide enough area largely untapped by the massed piles of computer books. This is particularly surprising since the book has Spectrum written on the front - a computer that has had every nook and cranny, every millimetre of every resistor analysed and discussed at length.

The solution to this conundrum is that the book is hardly about the Spectrum at all, the only ways in which it is machine specific are the example programs and a few pages of text.

Mostly The Micro Enquirer is a general guide to uses, adaptations and developments for your computer. There are sections on various computer languages, monitors, expanding memory, education, floppy discs, copyright, CP/M etc, etc, some fairly relevant to the Spectrum, others completely irrelevant. Misleading titles aside, it's a well written and designed book - a definite maybe for the Christmas stocking.

Book The Micro Enquirer Price £8.95 Micro Century Supplier

Spectrum Portland House 12-13 Greek Street London WIV SLE

# This Week

Program	Туре	Micro	Price	Supplier
Trace Race	Arc	Amstrad	£5.95	Cable Software
Arnold goes to				
somewhere else	Ad	Amstrad CPC 46	4£5.50	Nemesis
BMX on the Moon	Arc	BBC	£7.95	Superior Software
Winged Warlords	Arc	BBC	£7.95	Superior Software
Hi View	Ut	BBC	259.80	Acomsoft
Printer Driver	Ut	BBC	£11.50	Acornsoft
View Index	Ut	BBC	£14.95	Acornsoft
Viewsheet	Ut	BBC	£59.80	Acornsoft
Return to Eden	Ad	Commodore 64	29.95	Level 9
Challenger	Arc	Commodore 64	£1.99	Mastertronic
Halls of the Things	Arc	Commodore 64	26.95	Design Design
Hyper Biker	Arc	Commodore 64	£7.95	PSS
Percy Penguin	Arc	Commodore 64	27.95	Superior Software
Starrace	Arc	Commodore 64	£1.99	Mastertronic
Super Scramble	Arc	Commodore 64	£6.50	Mushroom
Zaxxon	Arc	Commodore 64	£8.95	US Gold
Chess	S	Commodore 64	£7.95	Superior Software
Draughts	S	Commodore 64	27.95	Superior Software
Cuddles	Ad	Spectrum	£1.75	8th Day
Faerie	Ad	Spectrum	£1.75	8th Day
Four Minutes to				
Midnight	Ad	Spectrum	£1.75	8th Day
Go West Young Mai	nAd	Spectrum	£3.99	Stockton Software
Ice Station Zero	Ad	Spectrum	£1.75	8th Day
In Search of Angels	Ad	Spectrum	£1.75	8th Day
Quann Tulla	Ad	Spectrum	€1.75	8th Day
BMX Racers	Arc	Spectrum	£1.99	Mastertronic
Backpackers	Arc	Spectrum	27.50	Fantasy

Jasper	Arc	Spectrum	€6.95	Micromega
Sir Lancelot	Arc	Spectrum	€5.95	Melbourne House
Space Walk	Arc	Spectrum	£1.99	Mastertronic
Tiler	Arc	Spectrum	€5.50	Interceptor Micro's
Hair Defenders	Ed	Spectrum	£5.7F	John Lyons
Hair Defenders (Sci 1)Ed		Spectrum	£5.7↓	John Lyons
Hair Defenders (Sci 2)Ed		Spectrum	25.75	John Lyons
Blue Riband	S	Spectrum	€5.95	CCS
Dark Star	S	Spectrum	27.50	Design Design
Insurgency	S	Spectrum	£5.95	CCS
The Prince	S	Spectrum	£7.95	CCS
War Zone	S	Spectrum	€5.95	CCS
Wunda Walter	Arc	Vic20	26.00	Interceptor

Key: Ad - adventure/Arc - arcade/Ed - education/ - strategy-simulation/Ut - utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

# New Releases

### **BIZARRE**

Swag is a two player game for the Electron — I always wonder about two player games how well do they do, are there enough friends to go around? Still, ours not to reason why.

The game is quite neat actually—the objective is to steal £250,000 worth of diamonds



before the other player. Diamonds appear randomly on the screen and can be simply picked up and taken to a cache in your house — provided you there first and can fight off the insurance company's droids.

In fact, the droids are trained only to go after one player or the other, but you change everything around by moving to certain places—other squares send your rival back to his home, shooting a police car makes it follow you around the screen, drinking a can of beer stops it. A bizarre game but fun.

Swag

Program Price Micro Supplier

£6.95
Electron
Micro Power
Sheepscar House
Sheepscar Street
South
Leeds LS7 IAD

### **AMAZING**

Tiny Code is a unique development program for the Spectrum which uses a reduced set of machine-code instructions to guide people into the heady delights of machine-code programming.

The program is by Amazing

Games, a curious company that have been releasing middling Spectrum software for quite a while.

The program is basically a simple user-friendly assembler that comes with a largish manual explaining the main commands available and how to use them.

For the price it's a reasonable try at something a bit different and I've certainly seen far worse packages from more well known companies.

Program Price Micro Supplier

Tiny Code £5.50 Spectrum Amazing Games 39 Maple Drive Burgess Hill West Sussex RH18 8EX

### 3D QUEST

Hill MacGibbon, the book publishers, moved into software a while ago and some of the first programs are now available. Many of the education programs are intended for the fairly young but two of its adventures, King Arthur's Quest and Aztec could find themselves with a bigger audience.

Both of the programs were written by Five Ways which also wrote the Lone Wolf programs for Hutchinson. All the Five Ways programs are marked by a fineness of deail and care over things like redefined graphics sets for text that set them apart from the norm.

King Arthur's Quest sets you the task of removing an evil spell cast by the wicked Morgana — you move through a three dimensional representation of the magical world of Camelot wherein there are strange characters both good and bad, helpful and unhelpful.

The only respects in which the program 'panders' to children are the lack of complex logical problems in the game and the fairy tale atmosphere that fills much of it. Certainly I don't think the fact that it is intended for children should put you off.

The 3D effect is nothing special, just a lattice that has been drawn with perspective and all the commands are simple single key presses, but

it has a nice sense of atmosphere and is surprisingly addictive. Well worth a look.

Program Price Micro Supplier King Arthur's Quest £7.95 Spectrum Hill MacGibbon 92 Fleet Street London EC4Y 1DY

### **BLOCKS**

Rolf Harris has endorsed the latest Commodore release for the 64. In fact Rolf helped design some elements of the program, which is a kind of artists' drawing program for kids. Rolf Harris' Picture Builder uses a number of differently shaped blocks which may be combined to create pictures.

Children should find it easier to use than normal designer programs since all commands can be expressed by simple joystick controls. With 254 shapes to choose from (an entire redesigned charcter set) it's possible to get some fairly attractive end results without too much effort. Anyway if Rolf's endorsed it, it must be OK.

Program

Rolf Harris' Picture Builder £9.99

Price Micro Supplier

Commodore 64
Commodore Business
Machines
I Hunters Road
Weldon Industrial
Estate
Corby
Northants

### NO SPRITES

Yonks ago Queen (the rock band) used to proudly place the message 'no synthesizers' on their record sleeves. Equally meaningful is the proud assertion made by Design Design of Dark Star. 'no sprites' it says.

True enough Dark Star, has no sprites whatsoever. What you get instead is an epic space game vaguely like Star Trek or Codename Mat, but with the emphasis placed on vastness rather than on graphics.



### ROBOT CITY

Hard core adventure fans and all persons of taste and discernment will be delighted to hear that the sequel to *Snowball*, *Return to Eden* is now available for almost every micro. Not only that, but it has graphics—around 250 locations are illustrated (although not, as ever, on th BBC version).

One of the virtues of Return to Eden is that the plot is so detailed, complex and rich that it is almost impossible to summarise, so we'll just skip that, shall we. Oh, alright then, it goes like this. Kim Kimberley has saved the spaceship Snowball 9 from disaster but has been mistakenly branded as a murderer. He escapes on a lifeboat and comes to rest on the planet Eden, populated only by various hostile beings and a robot city, now read on ...

As with previous Level 9 adventures, you get more locations and a wider vocabulary

Hard core adventure fans and than almost anywhere else. all persons of taste and discernment will be delighted to hear purchase for adventure fans



everywhere. Tony Bridge will

go gaga.
Program
Price
Micro

Supplier

Return to Eden £9.96

Level 9 Computing 229 Hughenden Road High Wycombe Bucks HP13 5PG

# **New Releases**

There are essentially three elements to the game. Space (the final frontier) in which a whole variety of baddies can be found, hyperspace gates which take you from one sector to another and planets over the surface of which you may skim. On the planets, you must find and destroy several surface towers — destroy the enemy bases they protect and you may liberate the planet and escape from it.

The idea of the game is to wipe out all the enemy bases on all the planets in the universe. Controls are kept to a relatively simple up, down, left, right, faster, slower, fire and a special key to show you a tactical map fo the area.



The graphics are clever—
the kind of vector line displays
found in the old asteroids
gmes, but souped up to provide a 3D illusion. Chances are
you will either find this one
vast, fast and astonishing or
deeply repetitive and boring.

Program
Price
Micro
Supplier

Dark Star £7.80 Spectrum Design Design 125 Smedley Road Manchester M8 7RS

### **BRAINLESS**

Want to blast everything under the sun? Shoot anything that moves? Bored by games requiring stratgy and thought? Couldn't care less whether you find the elvenking's magic sword or not? Ad Infinitum is what you want.

This aptly named game consists of 256 levels of alien bashing, round ones, square ones, diagonal ones, floaty ones, ones that shoot across the screen, vicious ones and cuddly ones. No matter what type, you kill them, and every time you wipe out one batch, another one comes along ad infinitum.

Aside from blasting you have only two other considerations — firstly if you blast too intensively your laser may overheat so watch your level, and secondly from time to time you have to dock for extra fuel bonus. Brainless, brutal and repetitive — should do well.

Program Price Micro Supplier Ad Infinitum £7.50 Commodore 64 Mr Chip 9 Caroline Road Llandudno Gwynedd LL30 2TY

### **EYEVIEW**

There's still some independent software around for the Dragon although The Human Eye is not the kind of program with which to make a fortune. It is simply, an educational program in which a cross-section of the human eye is slowly built up with a brief text explaining each part.

It has to be said that, despite being in machine code, graphically it is nothing much to look at — but that may be the Dragon's fault as much as the programmer's. There just isn't that much to the program — in a book it would account for no more than a couple of pages of text.

Program Price Micro Supplier The Human Eye £5.95 Dragon 32 A Hearn 64 Hillside Road Saltash Cornwall

### LOONY

The Perils of Willy should give Vic20 owners glum over the apparent demise of their machine something to smile about. The problem is it needs 16K expansion, but if you have it then you can get a real flavour of what made Manic Miner and



Jet Set Willy the successes they were on the Spectrum and Commodore 64.

The Perils of Willy has 33 screens of brain befuddling action. The things that made Willy great are all here—loony animals, bizarre bouncing things, seemingly unreachable objects that somehow must be reached, and astonishingly difficult obstacles to be passed.

The plot, such as it is, involves trying to find your way home after a riotous party—skip over the ducks and watch out for the trains. Marvellous fun and worth buying or stealing a memory expansion for.

Program Price Micro Supplier

The Perils of Willy £5.95 Vic20 (20K) Software Projects Unit 1 Bearbrand Complex Allerton Road Merseyside

### **AMSTRAD**

Chouls is a sort of Willy type program with a touch of pacman thrown in just in case. As such it would hardly merit very much attention but it is for the Amstrad being supported by growing numbers of new suppliers.

Although Miner-like, Ghouls isn't really in the same league — for one thing there are only four screens. On the other hand perhaps it's not really relevant to compare one machine's programs with another and Ghouls is not actually a bad game.

The idea is to run through a creepy mansion dodging the ghouls in question and leaping

and springing your way over spikes, moving platforms and up to overhanging ledges.

Program Price Micro Supplier Chouls £6.95 Amstrad Micro Power Sheepscar House Sheepscar Street South Leeds LS7 IAD

### LESSON

There are, it would seem, quite a few religiously committed people involved with computers — this is certainly a sign of something or other sociological. Computers are wholesome.

Anyway, Spectrum owning five to 11 year olds are going to be able to learn all about Moses, Jesus, the chosen people, the last supper, and raising people from the dead. If this isn't enough, you get to hunt for buried treasure as well.

The game consists of moving a little figure that looks like a walking black post box around various maps of various holy lands.

To go to the right place, you will need to consult your Bible, preferably a modern version. For those few households that lack a Bible, there is a sort of best of Bible highlights, which gives you a potted New Testament with hints cleverly revealed by italics or bold print.

The game allows you to practise various sections and is generally written in a bouncy colourful way with the Spectrum playing the odd 'oppressed people spiritual' to keep you going. At £7.99 for a game almost entirely in Basic it's a bit expensive though, isn't it?

Program
Price
Micro
Supplier

History Mystery £7.99 Spectrum Argus Press 1 Golden Square London WIR 3AB

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



## X-ray masking

p to one million transistors — the building blocks of all integrated circuits — can now one transistor when the technology was first developed in 1959. In fact, since 1959 the maximum number of components possible on a chip has almost doubled every year.

Unfortunately, if that trend is to continue the whizz kids of silicon valley (and Britain) have to perfect some radically new chip manufacturing techniques. Conventional techniques have now

all but reached their limit.

Almost every integrated circuit now available is made by the same process. A perfect, man-made, single crystal of silicon is sliced into him wafers. Each wafer than undergoes an immensely complex series of 'etchings', 'dopings' and 'oxidations'.

Etching begins with covering the wafer in a layer of photoresist (a material which hardens under exposure to ultra-violet light) and then exposing it through a mask which shades some areas allowing them to remain soft. These soft areas are then removed by a powerful acid leaving an unprotected surface.

'Doping' involves the implanting of impurities into the pure silicon thereby giving it the controllable semiconducting properties needed for building transistors.

Finally, 'oxidation' of the silicon by heating it in a furnace creates insulating layers. Multiple combinations of these three processes and a large number of different masks in a kind of vertical jigsaw of unbelievable sophistication creates the Z80's and 6502's. However — and here's the crunch — there is a limit to how densely the transistors can be packed. Smaller transistors mean smaller markings on the masks. However these markings can only be as small as the wavelength of the ultra-violet light used for the etching (0.003mm) since at that size diffrac-

tion of the light blurs the image on the wafer.
So what can be done to improve the chips of the

X-rays can be used for masking instead of ultra-violet light — X-rays have a much shorter wavelength than UV (0.0001mm) and so the markings on the mask may be made very much smaller. As anyone who has ever broken a bone will know, though, X-rays pass straight through most substances and so both a new kind of photoresist (to protect the wafer's surface) and a new kind of mask (to shade the relevant areas) need to be developed. This problem has yet to be adequately solved.

Even if it is, X-ray masking would be useless without plasma etching. This technique is an attempt to solve the problem caused by the acid spreading in the etching process. A plasma is simply a gas that has been heated in some way to such a high temperature that the atoms making up the gas are smashed apart into ions (heavy, positively charged particles) and electrons (light, negatively charged particles). In the plasma etching process the wafer, covered in photoresist and already exposed, is placed in the plasma of an inert gas such as Argon. The wafer is then made to attract positive ions out of the plasma by making it negatively charged. These ions leave the plasma in large numbers and at high speed where they smash into the photoresist with such energy that it is gradually vapourised (very similar to sand-blasting only billions of times finer). The soft areas vapourise more quickly and

The most exciting development of all is ion beam lithography. A high powered beam of ions is focused by magnets into a very narrow beam (like focussing the suns rays through a lens) of such intensity that it is able to cut the required pattern directly onto the surface of the wafer. The ion beam is controlled by a computer which has the integrated circuit pattern stored in its memory—thus removing the need for any mask at all. The problem with this technique at the moment is that, compared with etchning, it is quite slow and so its theoretical ability to make chips with 10,000,000,000 transistors per sq cm may be reserved for highly specialised chips.

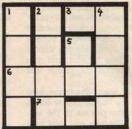
so are etched away.

Whether it's by X-ray masking/plasma etching, alternatives to silicon with ion beam lithography it is clear that by the end of this century we will see chips with upwards of 10,000,000,000 transistors per sq cm giving the ability to store ten Encyclopedia Brittanicas on a thumb-nail.

But it looks as if that will be as far as semiconductors will be able to go. What then? Glen Counsell

# Here's a clue

Here is a crossnumber puzzle, in which it is necessary to fill in the spaces with numbers according to the clues given.



Clues	Down
Across	1) A <sup>2</sup>
3) A	2) (A + B) • 9
6) A * B	4) B <sup>2</sup>
TO N D	B) B _ B

### Solution to Puzzle No 124

There are two possible answers.

The garden is either 264 yards long, 170 yards wide with diagonals of 314 yards, or 320 long, 72 yards wide with 328 yard diagonals. Both give a total route length of 1760 yards.

In the program the value A represents the longer side of the rectangle, B the shorter, and D the diagonal.

10 LET A=2.26 FOR B=1 TO A-1.36 LET D=SQR (A\*A+B\*B) 40 LET T=3\*A+2\*B+2\*D 50 LET T=VAL(STRS/T)) 60 F T=1760 THEN PRINT A,B,D 70 NEXT B 80 LET A=A+1.96 IF A>352 THEN STOP 100 GOTO 20

The program stops when A>352 since, even with the value B at a minimum, the route (3 \* A+2 \* D) is greater than (8 \* A). Therefore A must be smaller than 1760/5.

### Winner of Puzzle No 124

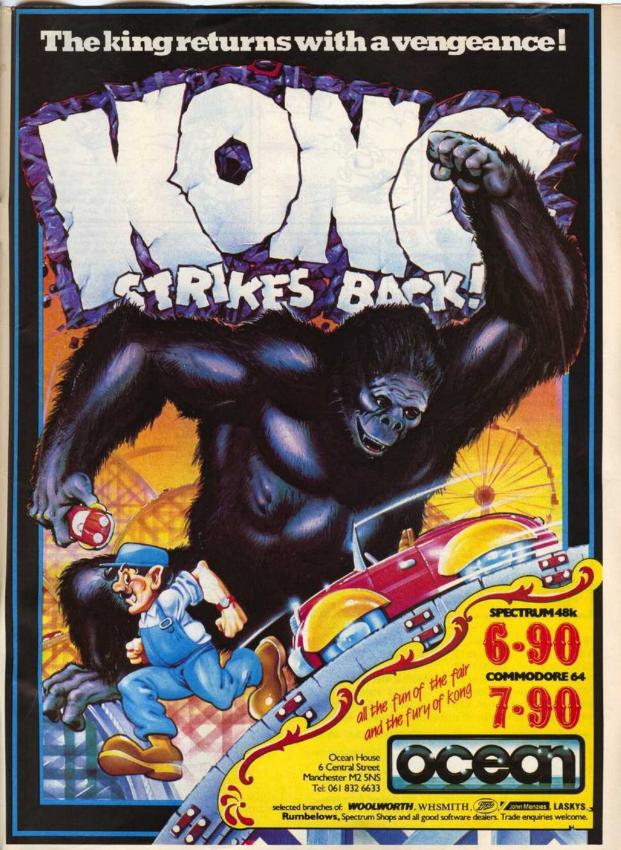
The winner is: C K Tame, Eastcote Drive, East Grinstead, W Sussex, who receives £10.

### Rules

If the puzzle prize can be sensibly solved using a computer, then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 130 is November 9.

### The Hackers







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